NEW ZEALAND
JOURNAL OF

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JANUARY - 1953

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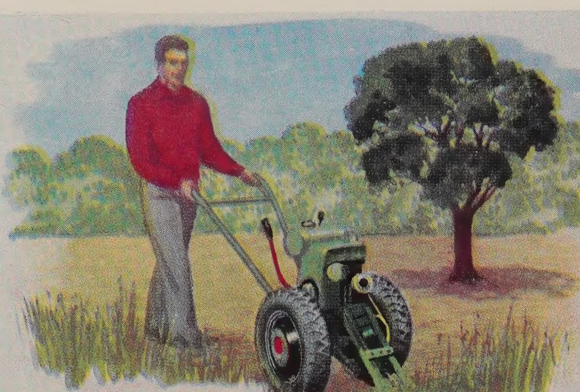

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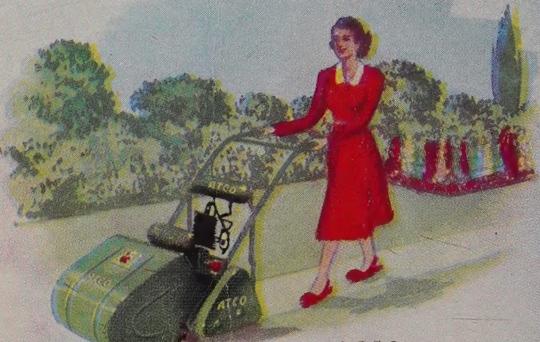

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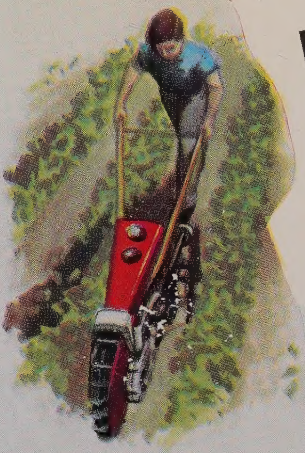

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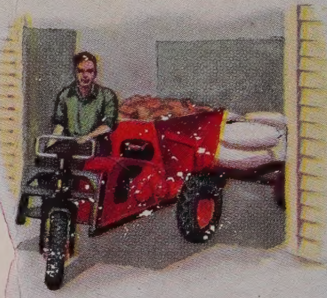

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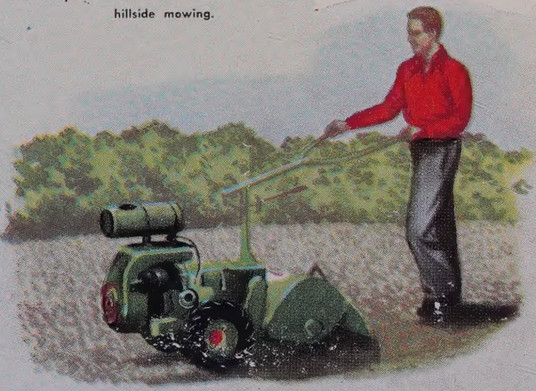

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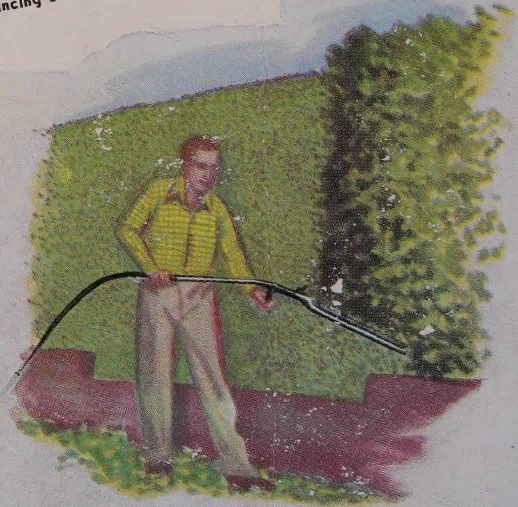

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This Month's Cover

Apples are the only fruit which New Zealand exports in considerable quantities, more than 1,000,000 bushels having been sent to the United Kingdom in some years. The principal apple-producing area is Nelson. This month's cover, which has been reproduced from an Ektachrome (Kodak (N.Z.) Ltd.) colour photograph by T. Lloyd, shows spraying of trees in the Appleby Research Orchard, Nelson, of the Fruit Research Station of the Department of Scientific and Industrial Research. The station has other research orchards at Oratia (Auckland), Havelock North (Hawkes Bay), and Earnscleugh (Central Otago).

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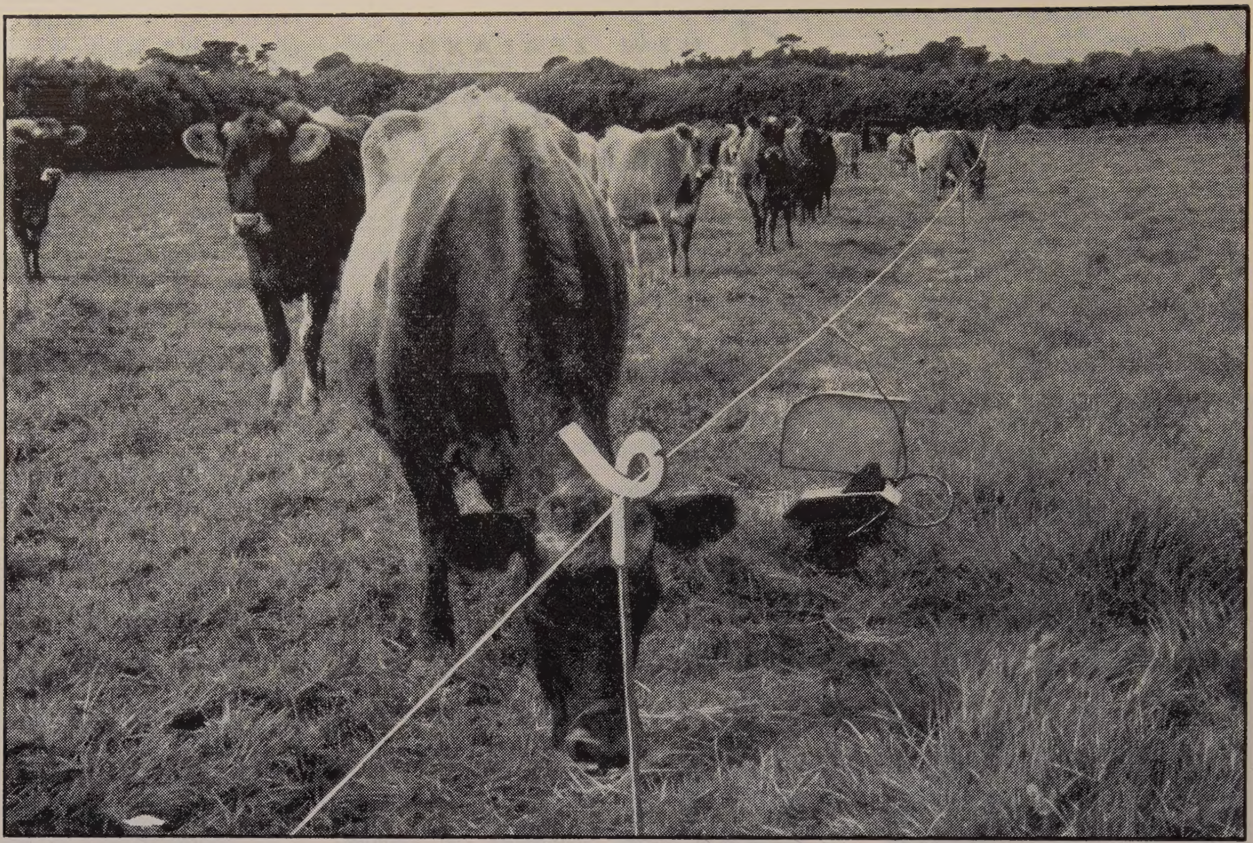


HEADING PHOTOGRAPH: Pasture grazing is controlled with a portable electric fence.

All-grass Farming in Taranaki

WAIMATE WEST DEMONSTRATION FARM

By E. M. BATES, Instructor in Agriculture, Department of Agriculture, Hawera

HIGH butterfat production per acre with minimum costs per pound of fat produced are possible on dairy farms relying entirely on grass for the feed supply, provided pasture management and utilisation are efficient and intensive. The following article describes the modern pasture management and grazing methods applied on the Waimate West Demonstration Farm in south Taranaki, where a policy of all-grass farming on light volcanic land has been in operation for the past 15 years.

SINCE cropping for supplementary feed for the dairy cows was eliminated on the property in 1936 the average butterfat production for the past 15 years has been 20,802lb. from 90 acres compared with an average of 15,157lb. for the previous 15 years, when the growing of both root and forage crops was a regular feature of farm management.

The recent introduction of the portable electric fence and the adoption of break feeding of pastures have stepped up production during the past two seasons to an average of 23,670lb. of butterfat, and it is confidently expected that with the further improvement of pastures butterfat figures will continue to increase.

The Waimate West Demonstration Farm is a dairy farm supplying milk to a cheese factory and producing pigs. It is not a Government farm, nor is any profit made by any individual or organisation. There are three somewhat similarly constituted farms in New Zealand, and it is believed there are no farms operated on a comparable basis in any other country.

The farm is on Normanby Road, 2 miles from Manaia and 12 from Hawera. The area is 90 acres of flat land, bounded by boxthorn hedges and subdivided as shown in the plan on page 4 into 15 paddocks, 10 of 6 acres each. All paddocks are watered.

A modern cowshed was erected 4 years ago, pig yards have been re-located, and construction of other modern farm buildings is under consideration.

Soil and Climate

The light volcanic loam soil of the farm is typical of the coastal belt in south Taranaki. It is not naturally fertile, being poor in phosphates and getting low in potash, and is very dependent on frequent rains to maintain the moisture supply for good pastures. Although the rainfall is satisfactory (40 to 50in. per annum), the distribution is often erratic, and provision has to be made to offset severe drying out in occasional summers. A few days of really fine weather in spring and early summer will also adversely affect pasture growth.

Pastures

On this land ryegrass-white clover pastures are difficult to maintain in a vigorous state and tend to run to flat weeds or Yorkshire fog. Good or indifferent management is reflected in pastures to a more marked extent than in most other intensively farmed dairy districts. Annual average dry-matter production from pastures is about 8000lb. The seasonal and yearly variation in pasture growth is relatively small compared with that in other districts in New Zealand.

Stock Policy

A grade Jersey herd with pedigree bulls is maintained. Replacements are bred on the farm and when about 6 months old are sent off to a grazier. They return as in-calf heifers a year later. Annual replacement numbers to build up the herd have varied from 14 to 20 over the last few seasons. Extra in-calf heifers, if required, are purchased. Increased herd numbers have allowed for culling of low producers after Christmas. An artificial breeding group is being formed in the district and the farm herd will be included.

Stock at 30 June 1952 were: 2 bulls, 14 yearling heifers, 14 2-year-old heifers, 75 cows, 8 sows, 50 other pigs, and 16 sheep (for killers only).

Farming Policy

For many years root crops and lucerne were grown for supplementary feed, but a start was made toward all-grass farming in 1936. A stationary electric fence unit at the cowshed was used during spring to reduce 6-acre paddocks to 3 acres for grazing. Production reached a peak in 1941, but fell away during and after the war.

Over the last 2 years intensive all-grass farming has been adopted and production is well on the way to new high levels. An annual crop for wintering pigs is the only crop grown. The present policy necessarily is directed to practical pasture management problems of intensive dairy farming.

Emphasis is placed on fertility building and the levelling up of all pastures through stock manipulation and the promotion of vigorous white clover with fertiliser to supply the ryegrasses, both perennial and short-rotation, with much-needed nitrogen. Pasture renewal is aimed at the maintenance of ryegrass, and each year the paddock poorest in ryegrass is ensiled, ploughed, and resown.

Efficient use (either by the grazing animal or as reserves of feed in the form of silage and hay) of all grass grown is the basic principle applied in pasture utilisation. Long spells, to get as much growth as possible, and quick grazing of the feed are the main goal in pasture management aimed at maximum production.

Grass is recognised as the best and cheapest milk-producing feed. The aim is to make plenty of grass available to the cows throughout the milking season and to rely on silage and hay for feed when the cows are dry.

The following details of pasture management and utilisation on the Waimate West Demonstration Farm for the four seasons of the year will show how the two aims of high production of feed and good utilisation of that feed can be secured on the dairy farm.

April to June

During April to June preparations are made for the new season. The dry stock are rotated round the farm and paddocks are shut up for winter-grown saved grass.

Saved Grass and Winter-grazing Paddocks

As the cows dry off in May the milkers are given the best feed available by rotationally grazing them in paddocks fed off in breaks. Dry stock follow to clean up paddocks, which are then topdressed, if not already done, and well chain harrowed to spread droppings. This system allows 4 paddocks (24 acres) to be closed—during the latter half of May and early June—for saved winter-grown grass to be used for early-spring rationing, and leaves 10 paddocks for wintering of dairy stock.

In Taranaki, where the land is light, too early closing for saved grass unduly encourages Yorkshire fog, also a winter grower. Deterioration of a sward to Yorkshire fog dominance may be rapid and the mature leaf of Yorkshire fog is a poor butterfat producer. Paddocks showing Yorkshire fog are not used for saved grass; only the best ryegrass-white clover swards are closed for this. The practice is to use resown paddocks renewed over the last 5 years, with the exception of the last autumn sowings, which are grazed for the first year. One or two of the paddocks early grazed by the dry stock after the second round are then left for further saved grass. If there is a shortage of saved grass, feed may be forced on one paddock with sulphate of ammonia at 1cwt. per acre about the end of June or later.

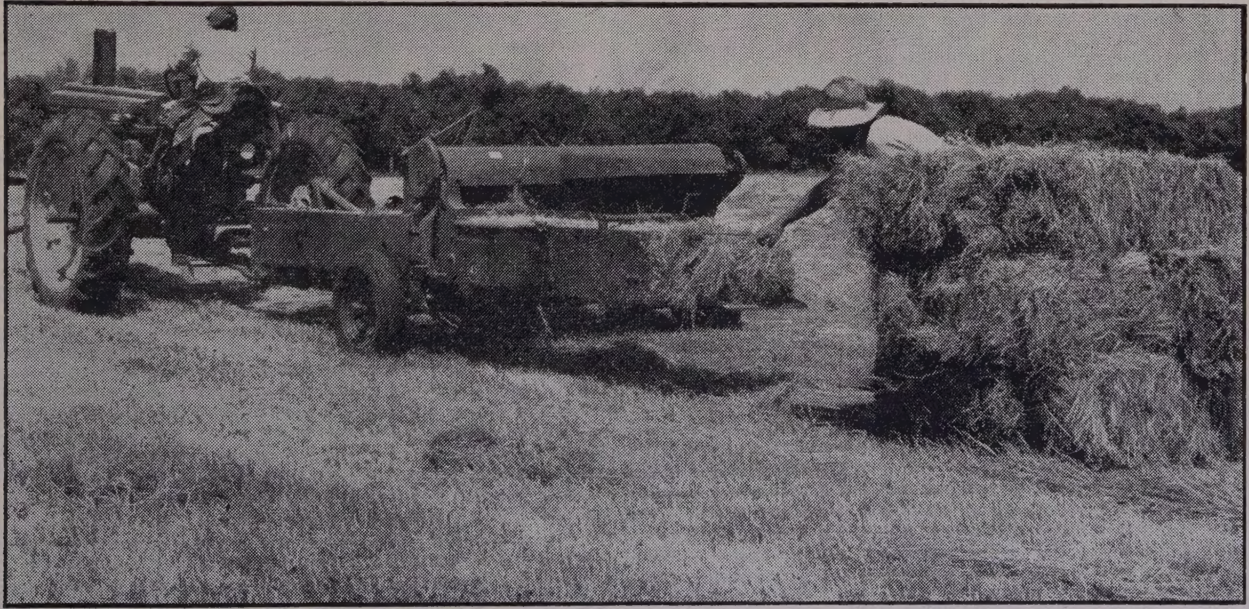
Winter Management

When all stock are dry they are run together in one mob until calving time (from mid-July on). Over this period systematic grazing tends to bring uniformity into the swards of grazed paddocks. Three days and three nights are allowed for a 6-acre paddock in rotating the dry stock round the farm. Having 10 paddocks for wintering allows 27 days' spell between grazings over this period. In each paddock, after the first day, an electric fence is erected across gateways to prevent or reduce pugging.

History of Waimate West Demonstration Farm

THE Waimate West Demonstration Farm site was originally an endowment for a dairy school. When this did not eventuate members of the Waimate West County Council took over the leasehold in 1919 and with an officer of the Department of Agriculture as chairman and a representative of the Farmers' Union formed the original committee of the farm. Practically no change has since been made in the administration. The property when taken over was ring fenced, had been cropped for years, and was feeding horse teams. Gradually the farm was developed as a self-supporting unit and dairying has continued, together with experimental and investigational work of interest to the district.

BELOW: Hay baling out of swath. Hay and silage are used to supplement pasture production.



All paddocks are chain harrowed immediately after stock are removed.

Winter Supplementary Feed

Winter supplementary feed is carted to the paddock where stock are at the time. There are usually about 90 in the mob and 20 bales of hay are fed out daily in June, any poorer hay being used first and spread in a definite system over the paddock.

Silage feeding is begun about a month before calving. By the early part of July hay has been reduced to 10 bales of better quality per day. A load of silage daily is also fed. The dry stock consume about 7½lb. of hay and 20lb. of silage each per day as well as a few pounds of grass. Although grazing is restricted in winter and early spring, hay and silage are fed to requirements. Quantities fed out vary according to weather conditions and the amount of grass.

July to September

The July to September period marks the transition from dry to milking stock. Waimate West Demonstration Farm cows begin to calve from mid-July on and about 30 have usually calved by the end of July.

Besides attention to calving, management is concerned with rationing of winter-saved grass and supplementary feeding, spring topdressing, and spelling for early-spring growth in the paddocks.

Rationing of Saved Grass

Saved grass has to last from mid-July until early September. This is supplied by 4 paddocks (24 acres) closed about mid-May, followed by 2 paddocks closed about mid-June after the second round of the dry stock, and lightly grazed new autumn-sown pasture.

In the 1951-52 season the first 4 paddocks of autumn-saved grass lasted until 3 September, about three-quarters of the ration for the milkers during this period being silage, which is fed liberally at this time of year to allow as long a time as possible for the later-closed paddocks to make good growth. These 4 paddocks were followed by the autumn-sown new pasture, which lasted 5 days, and then by the first of the 2 paddocks closed after the second round of the dry stock in mid-June. These paddocks had nearly 2 months' spell, and if the winter had been severe and growth consequently slow, an application of sulphate of ammonia at 2cwt. per acre would have brought on the feed in time.

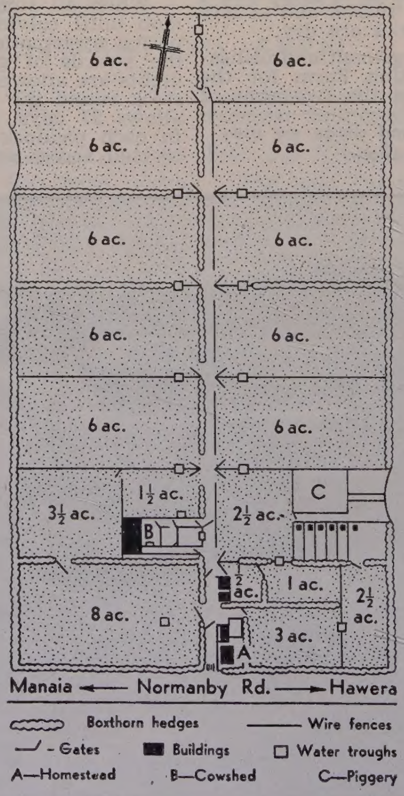
For the herd of 80 to 90 cows the rationing procedure is as follows: During the first week the few cows that calve go to the first break of saved grass, which is only about 6 chains by 8yds., and are left there most of the time. The next break, lasting about another week, is increased according to the number of cows calved, probably to 6 chains by 12yds. When about 30 cows have calved daily changes of breaks are made to allow sufficient grass for feeding for about 1 hour a day. For this purpose the strip required is only about 6 chains by 4yds. on good saved grass. The size of the succeeding breaks is increased with daily changes of the electric fence according to the number of cows calved. Another paddock is used at night and for feeding out, but later a portion of the rationed paddock already grazed is utilised for feeding out of silage and hay to appetite. When the first saved-grass paddock is finished the next is similarly treated. When the milking herd reaches 50 twice-daily changing of the electric fence is begun. This retains a break of suitable size, avoids overcrowding of cows, and reduces pugging of ground. Cows are not turned on to rationed grass until frost, if any, has gone off the leaves.

Pigs a Profitable Sideline

PIGS have always been kept at the Waimate West Demonstration Farm. Although the 6 acres required for pigs and annual crop would carry an extra 5 or 6 cows with less labour, the present price of pigmeats justifies continuing pig production. Eight large white sows are kept. From 40 to 60 pigs are wintered, mainly on fodder beet to appetite and meal (half barley, half meat meal) at up to 1lb. per head fed in molasses and water. The sows and larger stores may be break fed on fodder beet. During the dairy season pigs are fed to appetite on whey and the meal allowance is continued. The policy is to produce baconers to Christmas, tapering off to porker production, depending on whey supply.

Two acres are sown down to Rex fodder beet (see illustration on page 5) in spring and 1 acre to potatoes, carrots, etc. Two crops of fodder beet are grown before the area is either spring sown with partridge peas to be baled for pigs or spring sown to grass after the fodder beet.

Plan of Waimate West Demonstration Farm



In the early stages a supply of both hay and silage ample for 24 hours is fed out in the mornings, but from the beginning of August hay is fed out after morning milking and silage after night milking. This distributes the supplementary feeding better, with hay supplementing the saved grass.

Dry Cows on Supplementary Feed

The dry cows follow the milkers in the first rationed paddock for about a week, after which the paddock is chain harrowed and closed for spring growth. The ration for dry cows is mainly silage and hay. Grazing of dry stock is based approximately on 3 days and 3 nights per paddock for 80 dry cows. From the start of saved-grass rationing the dry cows are stepped up from 3 to 6 days and nights per paddock, so another spare paddock is available for further rationing if required, but otherwise it is left for normal spring grazing late in September. Hay and silage to appetite are fed out as long as possible. Usually the cows refuse hay about a fortnight before they do silage.

Grazing of Early-spring Growth

Though rotational grazing is practised on most dairy farms, still too few dairy farmers realise the importance of spelling paddocks as long as possible in the early part of the season so that they can make good growth. As soon as autumn-saved grass is finished they start a daily change round the farm, dispensing with feeding out as soon as they possibly can. This undesirable practice is avoided on the Waimate West Demonstration Farm by making full use of saved grass, hay, and silage during early spring.

Spring Topdressing

The main topdressing is in autumn with 3cwt. of serpentine superphosphate plus ½ to 1cwt. of potash per acre. Topdressing during spring, with superphosphate and potash, is confined mainly to new grass and silage and hay paddocks. Response to potash is most noticeable in spring, and topdressing is carried out in August. There is probably leaching of potash, though not of phosphate, and in a high-rainfall district mid-August to the end of August appears to be a better time to topdress with potash than early July. The period between those mentioned is exceptionally busy, because of supplementary feeding and cows calving, and topdressing does not get done then.

At the farm the dung from the yard is shovelled into the manure cart, which when filled is run on to one paddock. Three months' dung (about 1 cub. yd. per week) on a poorish paddock brought its carrying capacity to one of the best on the farm and resowing was delayed. Patchiness from applications of dung soon disappears when a paddock is grazed.

October to December

October to December is the peak period for milk production, the start of round-the-farm break grazing of each paddock in turn, if not already begun, and the time for saving silage and hay for use in winter, early spring, and summer.

Rotational Break Grazing

In ordinary paddock rotational grazing there is a tendency for the milk flow to drop the first day of change owing to the cows gorging. The drop is less noticeable where a daily change is made, but this method of grazing results in very poor management. Break grazing with two changes in the day gives more uniform daily production than normal rotational grazing, but of course does not smooth out fully the daily variations in milk production.

The Waimate West Demonstration Farm dairy herd is break fed rotationally over the paddocks of the farm after the rationed grass is finished toward the end of September. By this time pasture growth is coming away well. For the first break the electric fence is erected across the paddock to include the gate and water trough. About 1½ acres are enclosed in a narrow strip 6 chains long by 2½ chains wide. The exact size varies slightly according to the feed, but night and day breaks are approximately equal. Milking begins at 5.30 a.m. and 4.30 p.m. The fence is moved twice daily at 7 a.m. and 5 p.m. to include fresh breaks.

Fodder beet (Rex) has replaced sugar beet for winter feed for pigs at the Waimate West Demonstration Farm.

With break feeding the cows are always on fresh feed and are able to get good mouthfuls without searching and each break is more evenly eaten. When cows are given a whole paddock or a square block they wander about, wasting feed by trampling and fouling, and indulge in preferential grazing.

The point is that the grass is not rationed in the sense that the herd is restricted in feed, but that the area of the field made available for grazing is fixed to secure full feeding without undue fouling of the feed and a reasonable utilisation of milk-producing feed.

Ensiling and Haymaking

Pastures carry an abundance of good-quality feed in spring and it is usual farming practice to conserve surplus as silage and hay. During October several paddocks not required for grazing are missed by the herd in succeeding rounds, and by mid-October it may have been a month since one or two of the paddocks in the rotation have been grazed. The first paddock for silage, according to growth, may have been closed as early as mid-September if not required for grazing. Generally about 8 to 10 weeks' growth yields leafy material which makes the best silage. The best silage or hay is made from pasture cut just as the anthers emerge from the perennial ryegrass flowers. The tendency is to cut a little earlier than this stage for silage and a little later for hay. Silage is made in November, each stack taking 2 days, and hay baling may follow ensiling without a break, weather permitting.

In the 1950-51 season ensiling was completed in the third week of November and haying finished on 12 December. Usually 3 paddocks (18 acres) are ensiled and 2 paddocks (12 acres) hayed. Last season 24 acres were ensiled and 6 acres hayed.

Each year one stack of silage is made from the poorest ryegrass paddock before it is ploughed in December for a grass-to-grass sowing in February. To boost leaf production this paddock is manured when closed with 1cwt. of sulphate of ammonia per acre. Harvesting in the last two seasons has been conducted with two neighbours in the usual gang system.

Topping of Pastures

Early topping of pastures is regarded as essential to efficient pasture management where dairy stock only are

Electric Fence Unit

A PORTABLE electric fence controller, a reel to carry 200yds. of 14-gauge wire, and three ½in.- tubing iron standards comprise the equipment used at the Waimate West Demonstration Farm for break grazing of pastures. At one end standards have a vertical twist of doubled No. 8 wire covered with old claw rubber to hold and insulate the wire. Two S-shaped ⅜in. iron hooks complete the outfit, which is easily carried by one man. Only one wire is required for a new break, which is not separated from the previous break, because stock invariably concentrate on the new break. The average size of breaks in early spring is 1½ acres, in spring and early summer 1 acre, and after Christmas 1½ acres.

The reel with surplus wire is moved first and extra wire unrolled to the position of the next break. The reel is then hooked on to the fence or boxthorn hedge. The operator then back tracks to pick up standards and to remove the hook at the far end of the fence. This hook is carried to the new position and attached. Standards are then placed in position roughly in a straight line about 1½ chains apart with wire attached as the operator returns to wind up the reel. He then clips the controller to the wire, which is about 30in. above ground level; 20 chains' walking is required for a break of 6 chains by 2½ chains (1½ acres) and 7 minutes completes the changing of the fence position.

(See illustration on page 2.)

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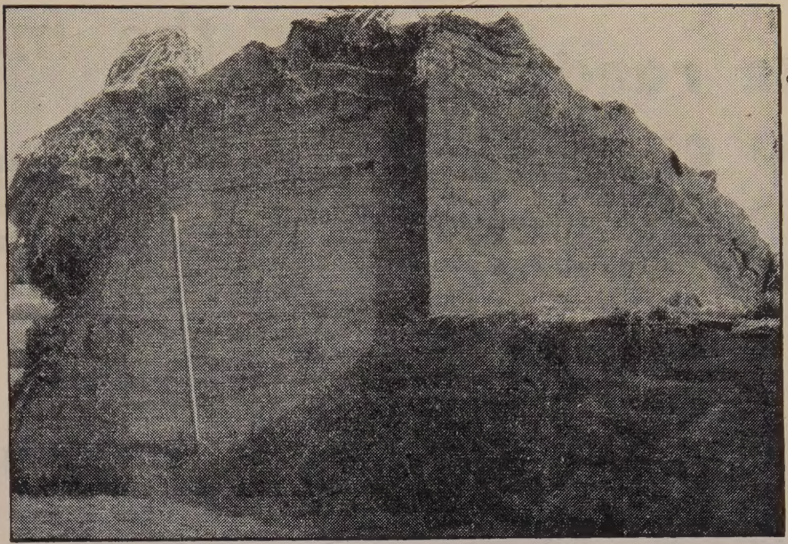
grazed. With the advance of spring, feed tends to harden and to run to seed head. During break grazing the dairy herd consume the bulk of good grass and are not driven to eat roughage, which is not milk producing. Normally from early to mid-December —but last season into January—each paddock is topped immediately after grazing as seed heads form.

If left too late, topping is of little value because of reduced recovery in pasture growth. After rain, topped paddocks recover rapidly and evenly. Actually in topping the mower is set low to level roughage clumps, which are mainly Yorkshire fog, cocksfoot, and weeds, which should not be allowed to reseed. Mowing weakens Yorkshire fog and cocksfoot by baring the crowns, but makes ryegrass tiller. Dung incidentally is spread most effectively by the mower. Decay of toppings spread thinly over a paddock aids fertility eventually. If the roughage is not too patchy, the herd will soon disperse it over the paddock and eat a fair proportion when it is wilted.

With heavy roughage some hand work with a fork may be required to prevent pasture smothering.

At Waimate West Demonstration Farm an untopped paddock led to a drop in milk production of over 200lb. of milk at each milking. It was the only paddock not topped. The sward deteriorated rapidly and was resown to grass last February.



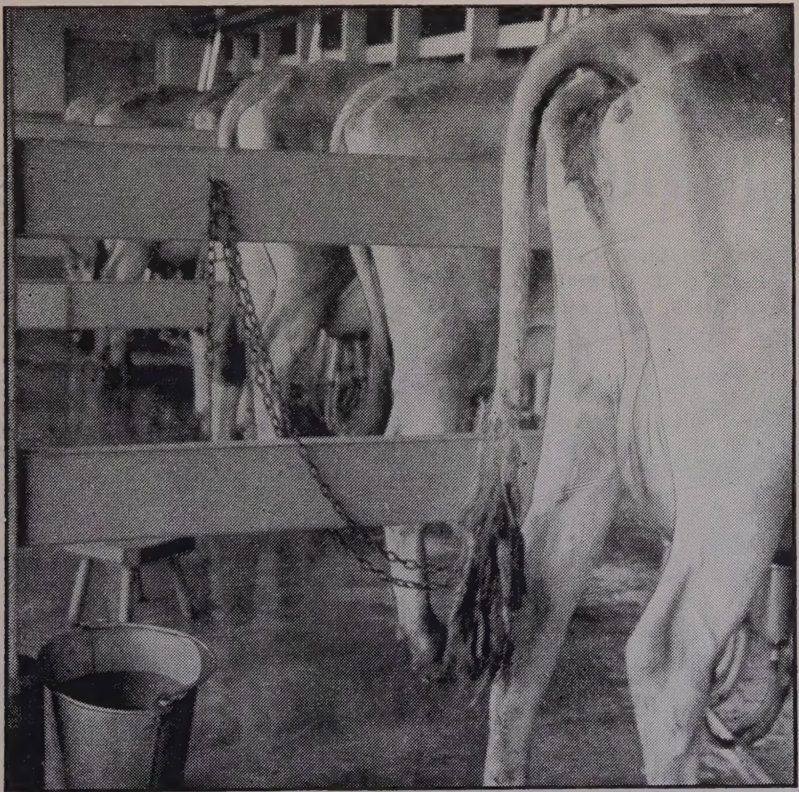
Silage has an important place in the feeding of the herd when grass is short.

January to March

In the quarter January to March summer feeding, pasture renewal, and the main autumn topdressing are dealt with.

Summer Feeding

Pasture growth normally dries off and loses quality during summer. There may be a shortage before autumn rains start a fresh slow growth, which continues through winter. Generally three-fifths of the production of the dairy herd has been made by the end of December. After that production normally falls off unless provision of milk-producing feed is made to sustain the milk flow. In 1950-51 at the farm 12,500lb. of butterfat was produced by the end of December and 11,000lb. after December. In the 1951-52 season butterfat reached 14,000lb. by the end of December and less than 10,000lb. afterward.



Good stock management is as important as good pasture management. At Waimate West Demonstration Farm there are no leg ropes and back chains are not normally used. Cows are not hand stripped.

Effect of Dry Spell

A dry spell is not felt immediately in rotational grazing, as paddocks ahead carry good growth. When this has been consumed and another round of the dry spell has begun milk production falls off rapidly from lack of new growth unless sustained by supplementary feeding to tide the herd over a difficult period. Early supplementary feeding of silage enables the grass grown before the dry spell to last longer, and the electric fence ensures better control of grass available. Eventually when rain falls desiccated pastures recover for grazing.

Autumn Grass-to-grass Sowings

The policy of ploughing the paddock with the poorest grass each year has already been mentioned. The practice is to plough in December after a silage crop to about 7in. deep if the soil allows. The furrows are then rolled. Discing is carried out at intervals, the first discing up and down the furrows, the next at about 30 degrees across the ploughing, and then in any direction. A levelling board is used between discings as required. Final operations are tine harrowing, rolling, sowing, and light harrowing. Consolidation from the bottom of the furrow slice to the surface, obtained as outlined,

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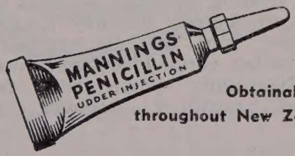

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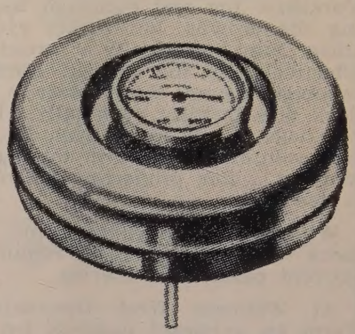

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encourages good root hold and vigour in the sown species.

The seed is sown with serpentine superphosphate about mid-February and later the area is autumn topdressed with another 3cwt. of serpentine superphosphate and 1cwt. of potash per acre. These early sowings are made successfully after summer fallow. Unless it is too wet, a predetermined date for sowing can also be made.

At the Waimate West Demonstration Farm paddocks treated in this way provide two to three grazings by the end of May, so that with the stack of silage made before ploughing there is no waste of time or feed.

Autumn Topdressing

Autumn topdressing is carried out over the whole farm, 3cwt. of serpentine superphosphate and ½ to 1cwt. of potash per acre being used.

Early topdressing stimulates the autumn flush growth and assists winter production of pastures.

No lime has been applied at the farm for over 7 years. Soil analyses show that no lime is needed, but that both phosphate and potash are required, and whereas responses to these are definite, no response has been shown to lime. There is now much less variation in the analyses of different paddocks of the farm compared with earlier tests, when analyses for potash and phosphate varied considerably. This evening up of soil fertility is due no doubt to the strict rotational grazing methods now practised.

Mechanical equipment has eliminated the heavy work of boxthorn hedge cutting.

Effect of Stock on Pastures

Throughout this article the methods of grazing management of dairy pastures to get full production from them and at the same time to maintain the pastures in good, vigorous condition over the whole farm have been stressed. The effective use of stock on the light land of this farm is the most potent factor in the promotion of vigour in pastures and in maintaining a good balance of grasses and clovers.

Heavy concentration of stock on small areas for short periods results in even grazing, full utilisation, even spread of dung and urine, and good hoof consolidation, which are all essential to vigorous ryegrass-white clover swards.

Spelling before grazing, with the length of spell long or short according to the time of year, allows the pastures to make the greatest growth possible, because the plants must have plenty of leaves to grow more leaf. Good utilisation, both by grazing day and night in each paddock in turn and by harvesting surplus spring growth as reserves for periods of low pasture growth, is essential in pasture maintenance and production and gives the highest possible butterfat production.

All these things essential to high butterfat production per acre are being achieved on this 90-acre farm by carrying 80 cows and young stock, closing 24 acres in mid-May and 12 acres in mid-June for early-spring feed, closing 30 acres in October and November for silage and hay, and by break feeding the spelled pastures in rotation throughout the milking season.

Systematic pasture renewal keeps pastures vigorous and free from weeds.

Harvesting the Honey Crop in a Small Domestic Apiary

Seasonal Notes for the Domestic Beekeeper

MANY domestic beekeepers will now be considering removing and extracting the surplus honey from their hives before the honey flow ceases and robber bees become a menace. In this article T. P. J. Williams, Apiary Instructor, Department of Agriculture, Hamilton, describes the various methods used in carrying out this work.

BEFORE the honey flow has stopped it is advisable to remove all surplus honey from the hives and avoid robbing, which becomes prevalent after the honey flow has ended. This work should not be done during wet weather, owing to the readiness with which honey absorbs moisture. Frames of honey partly capped should be left on the hive, as such honey will not have been ripened by the bees and when extracted and packed will not keep, but will quickly ferment. Only fully capped frames should be removed and the honey extracted. All honey should be extracted as soon as possible after it has been removed from the hive.

Bee Escape Board

Supers of surplus honey may be cleared of bees very effectively by the use of a bee escape board. The super concerned should be prised from the super below and the board slid between the two boxes, care being taken that the outlet to the board is not obstructed by burr comb. If any of the hive material has become warped or broken, openings should be packed with cloth or paper.

The escape board should be placed on the hive late in the afternoon and the honey removed early the following morning.

A simply made bee escape board was described in an article by D. Roberts in the August 1951 issue of the "Journal of Agriculture". It has no springs or restrictive devices, thus eliminating the possibility of any blockages.

Brushing Bees

Some beekeepers use a brush with which to remove the bees from the frames, but unless this is used correctly, the bees are unduly disturbed and become vicious.

Spread a sack in front of the hive; over the sack place an empty super with one end resting on the bottom board of the hive so that there is a bee space between the super and bottom board. Remove the super of surplus honey from the hive and place it over the empty super, replacing the lid on the hive. Remove one frame to give room and sweep the bees from the side of the super and the side of the first frame. Then push this frame over to the side of the super and sweep its other side and the side of the second frame; then move the second frame over and sweep its other side and the side of the third, and so on until the other side of the box has been reached. The super of honey is then removed, and the bees which were brushed into the empty super will crawl up into the entrance of the hive. The brushing method for removing bees from frames is fully described and illustrated on pages 88 and 89 of Department of Agriculture Bulletin No. 267, "Beekeeping in New Zealand", which is available from main offices of the Department at 2s. 6d. per copy, post free.

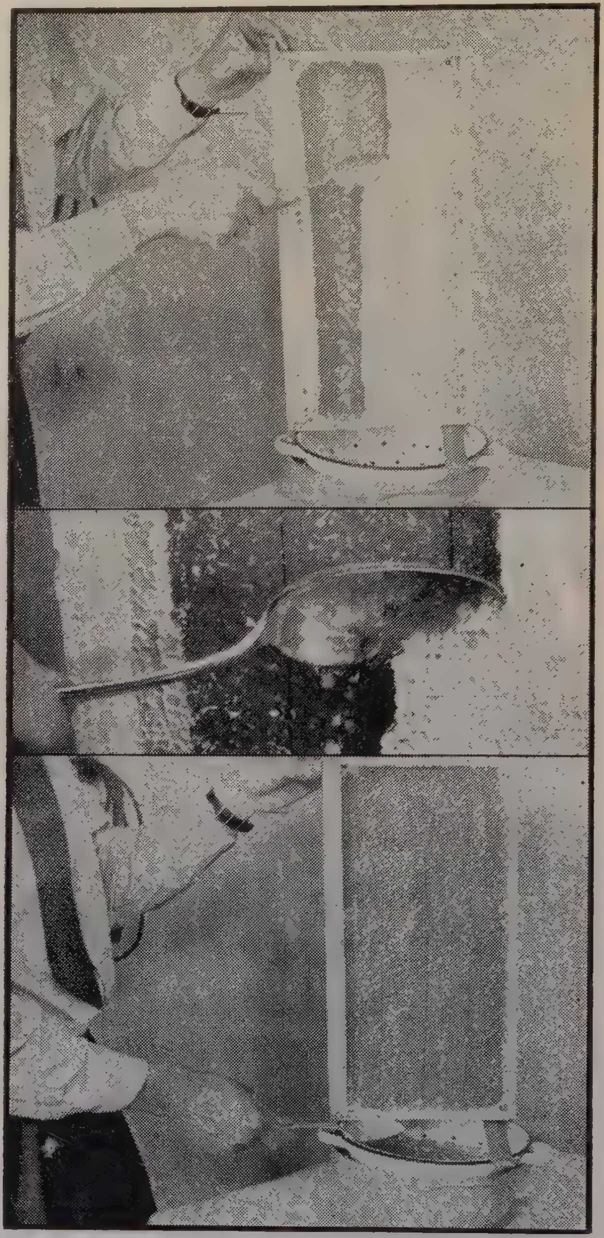
Extracting Honey

Care should be taken to ensure that all utensils for handling the honey are thoroughly clean and sterile.

Where the beekeeper has a honey extractor there should be no difficulty in extracting the crop, but where the number of hives does not warrant the expense of a honey extractor another method will have to be used. Some beekeepers cut the comb out of the frame and strain the honey through muslin cloth. However, this method is costly, as the foundation wax is destroyed. A far better way is to scrape each side of the comb, using a well-worn tablespoon, the edges of which have become sharp from constant wear. The honey and wax are scraped off down to the midrib and the foundation is left intact.

These frames may then be returned to the hives for further use, so saving the expense of fitting new foundations.

The frame is scraped over a colander which stands in a suitable dish. The honey will strain through, leaving most of the wax behind; any wax in the dish may be skimmed off after the honey has been allowed to settle for a day. This wax should be put aside to be later melted down. An article dealing with this process will appear in a later issue of the "Journal".



Method of scraping honey from a frame. Upper—The frame is held vertically and the honey scraped downward with a spoon into the strainer. Middle—The spoon is dug into the comb but only allowed to graze the foundation. Lower—Each side of the frame has had the honey scraped from it, leaving the foundation intact; the frame may be returned to the hive.

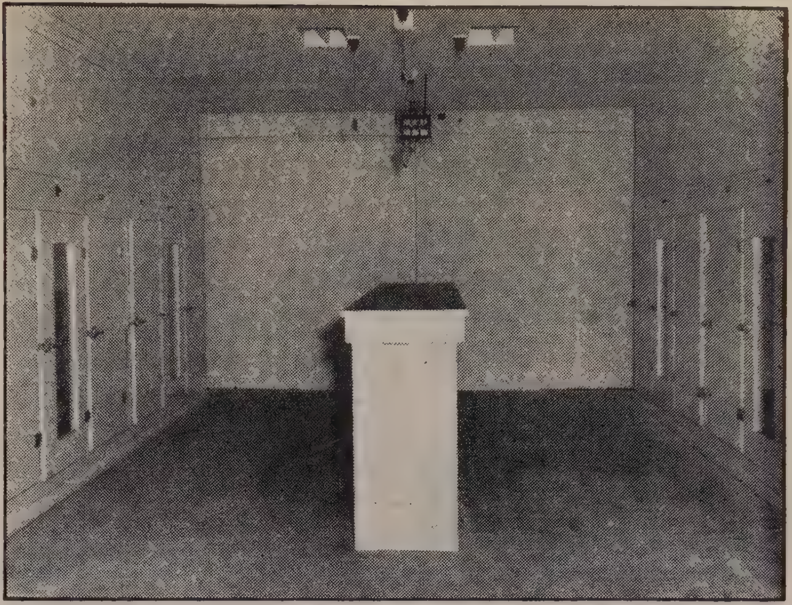
The frame in the illustrations yielded just over 5lb. of honey and 3oz. of beeswax.

Importance of Sanitation on the Poultry Farm

A HIGH standard of sanitation on a poultry farm is essential and without it there is little hope of avoiding disease. In this article H. K. Mullins, Poultry Instructor, Department of Agriculture, Hastings, describes methods to aid in achieving this standard and lists the essential requirements. The rapidity with which disease can spread through a flock and the time and expense necessary to combat it are factors apparent to most experienced poultry farmers, yet many fail to observe even the most basic principles of sanitation.

THE time required for blood testing the breeding stock, fumigating the incubator, and even deworming the pullets will be partly wasted if the baby chicks are placed in filthy boxes and the young stock reared on stale, dirty ground.

It is extremely easy to throw dead chickens on to the roof of a colony house, but eventually these will entice hawks, stoats, and other vermin, resulting in heavy losses of poultry. Diseased carcasses of poultry thoughtlessly thrown in some convenient corner can be dragged round the farm by dogs, resulting in possibly clean ground becoming contaminated with diseases such as leucosis or coccidiosis.

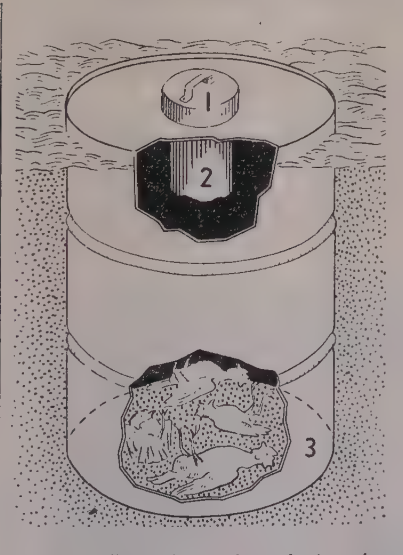


[R. W. Orr photo.

A good example of excellent hygienic conditions in an incubator room, giving maximum protection from disease.

Disposal of Dead Fowls

The disposal of dead fowls is a problem to the average poultry farmer. It is not always easy or convenient to dig a hole every time a bird dies, and the disposal unit illustrated below should be useful to those faced with this problem. Designed by the Department of Agriculture, New South Wales, it consists of a 44-gallon drum with one end removed. A hole large enough to take an 8in.-diameter earthenware drain-pipe is cut in the other end. A pit is dug to take the drum, which is placed with the end of the pipe an inch or so above ground level. The earth should be packed round the drum as tightly as possible. The flange of the pipe will hold it in place and a close-fitting lid will prevent any offensive odours. The unit can be removed to a new site when necessary, thus avoiding the digging of numerous holes for the disposal of carcasses.



A 44-gallon drum buried in the ground makes a good movable unit for disposal of fowl carcasses. 1—Close-fitting lid. 2—Collar end of earthenware drain-pipe. 3—The bottom end of the drum is removed.

An alternative is to construct an incinerator. This is a permanent structure which, if correctly used, affords the most effective and hygienic way of disposing of dead birds. An essential is an ample supply of dry wood to obtain a good fire before any birds are put into the incinerator. It is desirable to guard against two errors when using an incinerator. There is always a tendency to put off lighting the incinerator and in consequence to allow an accumulation of dead birds, which become fly blown and are a breeding ground for meat flies. The other error is to overload the incinerator with carcasses before a really good fire is established. The cleaning out of a half-burnt-out incinerator at a later date is an unpleasant job. It should be remembered that a good draught is essential for rapid combustion.

The Incubator Room

It is often a fact that the very place on a farm where the strictest hygiene should be observed is often the most neglected. Now that the incubation rush is over the time is opportune to give the incubator room a really good clean out. Hatching trays should be thoroughly scrubbed with a good disinfectant and left in the sun to dry. The remainder of the incubator, particularly the hatching compartment, can be cleaned out with a vacuum cleaner, care being taken to remove all tiny particles of shell and fluff, which may be harbouring pullorum infection.

Chick boxes, which are invariably placed on top of the incubator, should be removed to a more satisfactory place for storage. Diseases such as omphalitis are encouraged by chickens being subjected to dirty conditions in the incubator and chick boxes. The disease enters the chick's unhealed navel, and it can result in severe losses among the chicks for the first week. All floor coverings should be removed and sacks should be replaced with new ones. All dirty chick boxes and used litter from chick boxes should be burnt; if any such are used next season, they will be a great source of disease. Many poultry farmers are careful to use clean chick boxes when dispatching day-old chicks to their customers, but are careless about the condition of boxes used for moving their own chicks from the incubator room to the brooder houses. After the incubator has been thoroughly cleaned at the end of the season it should be fumigated with formaldehyde while the machine is wet. Chick boxes which have only been used once on the farm may be placed in the incubator for fumigation, but before this is done they should be dampened to make the fumigating effective.

The Brooder Shed

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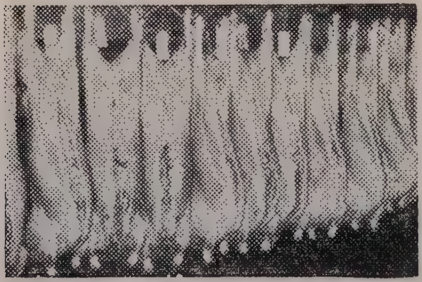

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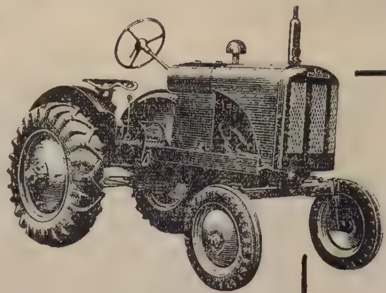

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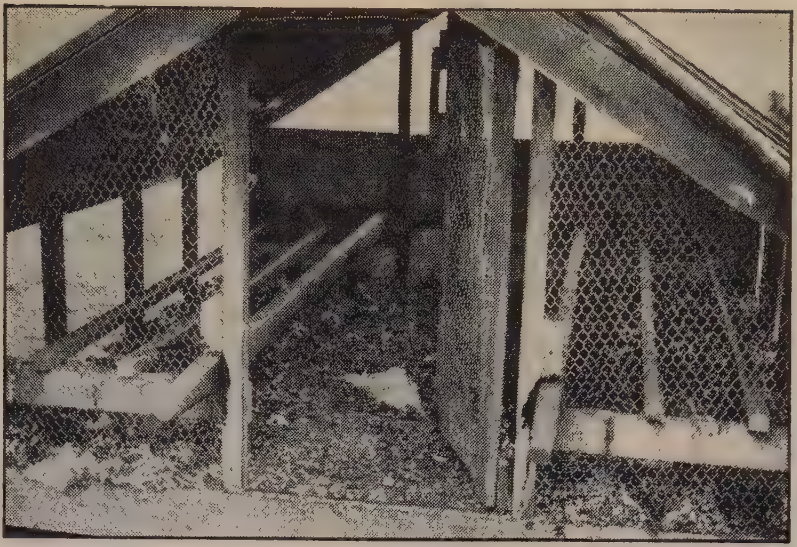


[*Fraser Niederer photo.*

A colony house for rearing growing pullets in which droppings should not be permitted to rise above the netting floor. Note the carcass which has not been removed. Cleanliness is essential in all phases of poultry rearing.

removed from the brooder shed to range houses on fresh, sheltered pasture. Consequently the brooder shed should receive a thorough overhaul. Old litter and droppings should not be left just outside the door for the wind to scatter, but should be removed to either the vegetable patch or some suitable spot where they can be used at a later date. Fowl manure, which contains a high percentage of nitrogen, should not be left exposed, but should be stored in a dry shed where the nitrogen, a valuable plant food, will not be leached out. Where it is necessary to remove the manure direct to the vegetable patch or orchard it should be covered or turned in immediately. Poultry manure is strong and should be used sparingly when fresh.

Though many practices are adopted for cleaning brooder shed floors, one which has proved satisfactory is to disinfect the floor thoroughly with a strong solution of washing soda. Two double handfuls in 4 gallons of water will provide a solution powerful enough to kill most bacteria. The wire frames on which the chickens are brooded should be hosed and then creosoted, care being taken to remove all droppings from the ½in. netting. Perches should be inspected for red mite and where necessary painted with creosote. There is no doubt that the brooder accommodation will be ultimately reflected in the adult stock's capacity as layers and breeders. Houses which have inadequate ventilation, damp floors, and are overcrowded cannot produce healthy, thriving stock.

Where brooder houses have outside grass runs for the chicks care of these must also be considered. Some poultry farmers break these up annually and resow with grass seed in autumn. This is an insurance against the ground becoming infested with coccidia and parasitic worms. If this is not done every year, it should be carried out following any season in which there has been an outbreak of coccidiosis. When the runs are not broken up the grass on them must be kept short to allow the sun to penetrate to the soil. Hot sun and dry conditions help to destroy internal parasites, but long grass and weeds assist in harbouring them. This is an important point too often overlooked by poultrymen.

Dry Litter Essential

A dry floor and dry litter in the brooder house are essential for good health and constitution of the birds. Green concrete is a menace to chickens and has been responsible for countless outbreaks of coccidiosis. If floors are concreted in midsummer, they have sufficient time to dry thoroughly before the hatching season in July, August, and September. Hydrated lime spread over the floor at 10lb. to 100 sq. ft. has been found effective for absorbing moisture and keeping the litter fresh and dry.

Overcrowding

Though it is common to rear chickens in large hatches on commercial establishments, their rate of growth and feathering is usually slower than those reared in hatches of 180 and under. When it is realised that chickens nearly double their original weight in 2 weeks it can be readily understood how quickly they become overcrowded. Most brooders on the market are overrated as to the number of chickens they can accommodate, the number quoted usually being practicable for only 2 or 3 days.

A concrete washing trough outside the incubator room for washing and disinfecting equipment is essential for good sanitation.

Ventilation and Drainage

Adequate fresh air in a brooder or laying house is most important. The hover should be raised a few inches each week, and the front of the house should have netting right to ground level. Provided hinged shutters are attached for use in rough weather, little harm can be done, and a maximum of sunlight and fresh air is permitted to reach the far corners of the shed. Attention to these points will assist largely in combating disease and thus increase the economic value of the farm.

Pullorum Disease in Poultry

PREPARATIONS should be made now for the autumn hatch by blood testing the poultry flock for pullorum disease and by cleaning and fumigating the incubators. A vacuum cleaner is ideal for the cleaning work, and advice on fumigation may be obtained from the local Poultry Instructor.

Good drainage round poultry housing of all types is as essential as efficient ventilation if sanitary conditions are to be maintained. Poor ventilation and damp conditions are not conducive to good health in either young or adult stock. Constitutions are lowered, making birds more susceptible to attacks of disease. It is of particular importance to ensure good drainage around housing on heavy soils.

A Survey of the Trade in Agricultural Machinery

"A SURVEY of the Trade in Agricultural Machinery", issued by the Commonwealth Economic Committee*, shows that the value of world exports of agricultural machinery in 1951 was more than £300,000,000, compared with about £25,000,000 in 1938. Though the United States remains the principal producer, user, and exporter, expanded production in Commonwealth countries has enabled them to increase their share of the world's total exports from 15 per cent. to 33 1/3 per cent. and to satisfy a rising proportion of their own requirements among themselves.

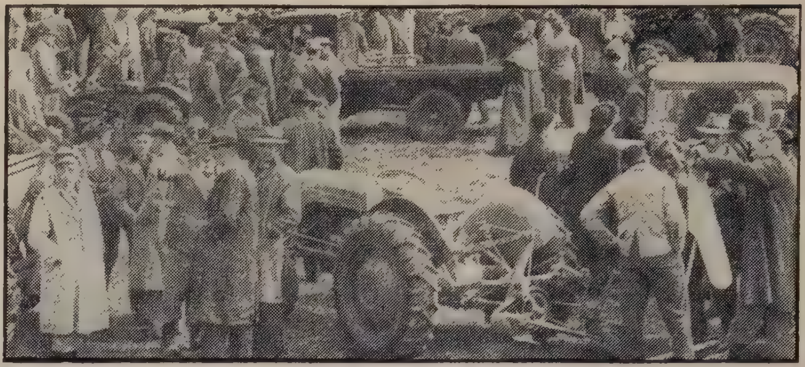
THE survey shows that on the whole the rises in agricultural machinery prices since before the war appear to have been considerably less than those of the principal agricultural commodities. Notwithstanding the great progress in agricultural mechanisation already achieved all over the world, there is technically scope for much more. Many of the traditional barriers to mechanisation have been breached and, though there are economic difficulties, the urge for greater agricultural output combined with widespread increases in the cost of labour should ensure that further advances will be made.

Production Trends

Production of simple implements is carried on in almost all countries, but large-scale output, particularly of the more complex implements and tractors, is confined to a relative few with well-developed industrial resources. In general, output has risen to well above pre-war levels except for items such as horse-drawn ploughs and reaper binders, which are giving way to their more advanced counterparts. A particularly notable feature of the production picture has been the post-war emergence of the United Kingdom as the second largest manufacturer of tractors in the world with an output in 1950-51 of well over 20 per cent. of the number produced in the United States. Tractor production has also reached considerable proportions in Canada and Australia, and arrangements have been made for it to be started in the Union of South Africa and India. Probably the other most significant development in recent years has been the extension by the principal manufacturers of their policy of establishing plants in other countries.

Progress in Commonwealth

An important indication of the spread of mechanisation is the rising number of tractors used in agriculture, the world total being estimated at 5,500,000 in 1950-51 compared with 2,000,000 in 1938-39 and 1,200,000 in 1930. Owing to the immense scale of her agriculture, the United States is by far the largest user of farm machinery, but several Commonwealth countries are high in the scale of mechanisation.



Farmers are alert to the possibilities of use of a wide range of machinery to reduce drudgery, increase efficiency, and combat the labour shortage.

Canada, for example, has the second largest number of combine harvesters in the world and Australia the third, and the United Kingdom has the second largest recorded number of potato and beet harvesters. Indeed, it seems that, comparing like with like, agriculture in Commonwealth countries is more highly mechanised than elsewhere.

World Trade

After the restrictions and destruction of the war, trade in agricultural machinery rapidly rose to unprecedented levels. The value of total exports in 1951 amounted to over £300,000,000 compared with about £25,000,000 in 1938, with tractors forming a somewhat higher proportion than before the war. Though the changes in prices and exchange values that have taken place must be taken into account, this represents a very substantial increase in the volume of trade.

The report also draws attention to important changes in the pattern of trade. Immediately after the war the United States and Canada were almost the only exporters of consequence. By 1951, however, the United Kingdom and Canada together provided a third of the world's exports, compared with 15 per cent. in 1938, and the United States' share was somewhat reduced. The remarkable rise in United Kingdom exports was due mainly to the progress of the country's tractor industry, whereas Canada developed a very large reciprocal trade with the United States, based on the rationalisation of production by firms with plants in both countries. At a lower level Germany's exports, particularly to neighbouring European countries, expanded rapidly in the years 1949-51. These four countries provide more than 90 per cent. of all exports, but imports are widely spread, with Canada, the United States, Australia, and South Africa occupying the first four places. Notwithstanding the reduction of the United Kingdom's imports to a very small figure, the Commonwealth as a whole absorbs nearly half the world aggregate.

Reviewing briefly the principal trends of invention in recent years, the report shows how increasing attention has been directed toward easing the burden of manual toil on farms and toward mechanising processes that call for seasonal peaks of labour. Thus balers, loaders, handling gear, electric fencing, and dung spreaders have gained rapidly in popularity. An important aspect of development has been the adaptation of standard implements for new tasks under widely different conditions.

The report draws the conclusion that, whatever the short-term difficulties, progressive increases in mechanisation are in the long run inevitable. They will be encouraged because of the general desire to reduce the burden of physical labour and by the need to offset rising labour costs, because technically there is great scope for them, and, finally, because manufacturers may be expected to seek vigorously for outlets for the products of their vastly expanded capacity.

New Zealand Figures

The report is of particular interest to New Zealand because of the very rapid advance of farm mechanisation in this country. This has taken the form not only of an increase of over 300 per cent. in tractor numbers between 1941 and 1951, but also in the mechanisation of various other farm tasks, including milking, shearing, pumping, and arduous and monotonous jobs such as post-hole digging, hedge trimming, draining, weed spraying, and wood sawing.

Though manufacturers of farm machinery in New Zealand have done an excellent job in providing certain specialised equipment such as milking machines or the relatively simple type of implements such as ploughs and other cultivating equipment and drills and topdressers, the limited market in this country and the absence of an iron and steel industry necessitate the importation of all the more complex machines, a situation likely to continue for many years. Hence this comprehensive survey of trade in agricultural machinery will be valuable to both farmers and administrators.

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* Thirty-sixth Report—"A Survey of the Trade in Agricultural Machinery", published for the Commonwealth Economic Committee by H.M. Stationery Office, price 7s. 6d. net. (7s. 9d. posted.)

Selection of Fruit for Shows

COMPETITIVE fruit exhibitions are held in all districts where fruit is grown either commercially or in home gardens. These exhibitions, whether held at the large provincial or district shows or at small horticultural society shows, are of real value both to the producers and the public. Much time and care are necessary in the selection of fruit for exhibiting and very often results have been discouraging to exhibitors. Disappointing results have often been due to lack of knowledge of the finer points involved, and this article by L. R. Renouf, Horticultural Instructor, Department of Agriculture, Auckland, should give a better understanding of the requirements of fruit selection.

TO understand fully the requirements for show fruit it is necessary to know the basis on which fruit is judged.

The division of fruit into dessert or culinary classes affects the requirements. In most instances larger fruit is preferred in the culinary section, and the allocation of points in judging in other respects in each class will be on a slightly different basis. Some varieties are dual-purpose and may be entered in both classes.

Apples and pears, fruits that make up a large proportion of the total fruit exhibited, are judged under the standard rules. For judging purposes these fruits are classified into two groups, "Exhibition", which covers single-plate lots and collections of plates, and "Commercial", which covers case lots.

Common Exhibition Requirements

When fruit is being selected for shows many factors, enumerated in this article, have to be considered. All are important and the lowering of the standard of any one of these may mean the loss of an award. The relative value of each varies and will be explained later in this article.

These factors, which affect all fruits, are:—

Size

Apples and pears should conform to the sizes in the schedules of the main varieties in the tables of standard sizes on page 17, subject to the following variations:—

All culinary exhibits, both case and plate lots, are allowed a margin of ⅛in. above or below the stated size. In all other classes the margin is 1/16in.

Exhibits outside these variations would be penalised against fruit of the correct size at the discretion of the judge.

The sizes in these schedules can be taken as a guide for similar varieties.

The commercial sizes and counts are for standard apple and pear cases.

Stone fruits: For all kinds of stone fruits sizes above the average for the particular variety should be selected. Excessively large fruits should be avoided, as beyond a certain point size may become a defect.

On account of the great number of varieties produced of each kind of stone fruit, no sizes have been laid down.

Citrus fruits: Sizes of citrus fruits to select for exhibition are:—

Lemons	2⅜in. to 2½in.
Oranges	2¾in. to 3in.
Grapefruit	4in. to 4½in.

The basis for judging citrus fruits is entirely different from that for pip and stone fruits; information on the requirements for citrus fruits is available from the local Horticultural Instructor.

Uniformity

Specimens selected for each class should be as uniform as possible in size, shape, colour, and maturity. The aim should be to have all specimens alike in every particular.

Form or Shape

The shape of the fruit should be characteristic of the variety. Variations in shape occur in a variety when it is grown under different conditions, and preference should be given to fruit approaching the perfect shape of the variety.

Condition and Flavour

Fruit should be picked at the stage of maturity that will ensure its being in the best possible condition at the time of exhibition for the class in which it is entered. To have the best flavour fruits should be mature, but stone fruit should not be soft ripe.

Colour and Appearance

Colour and appearance necessarily go together. Colour is generally considered a high red or blush and should be characteristic of the variety.

Some yellow or green varieties of fruit show natural blushes which improve their appearance, and these should be preferred to those not showing colour. Other yellow or green varieties should be selected for their natural colouring.

In cooking varieties colour and appearance will not be rated as highly as for dessert varieties, but fruits showing the highest colour and brightest appearance should be selected.

It is generally recognised that the natural bloom on fruit should not be rubbed off. However, to produce fruit

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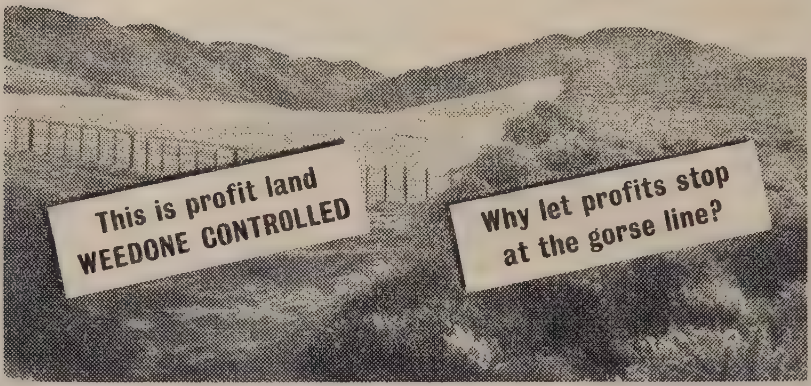

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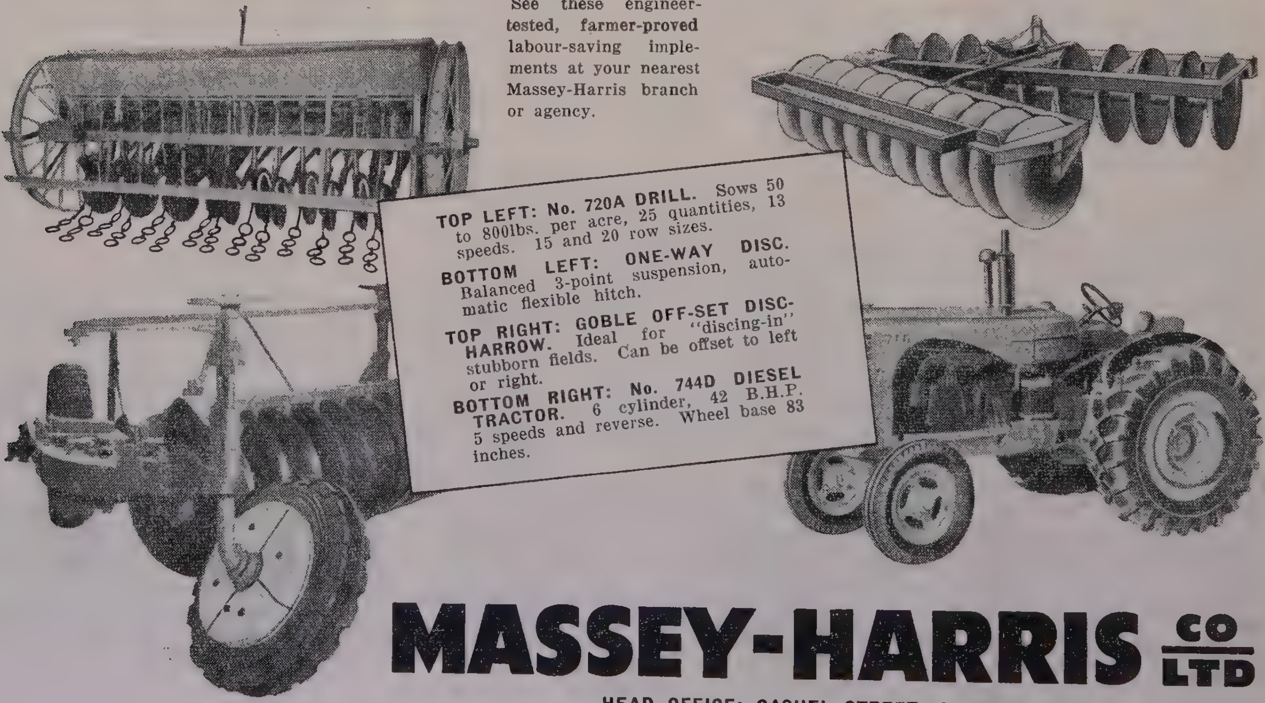

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of the high quality required for shows it is necessary to apply sprays, which may leave unsightly residues, which, if not removed, will detrimentally affect the exhibit. It is advisable to rub off the bloom rather than exhibit fruit showing spray deposit. Similarly where the bloom is smudged in handling it should be rubbed off. Unmarred bloom of plums and cherries should not be rubbed off.

Colour in fruits comprising an exhibit should be uniform in degree and extent.

Freedom from Blemish

Fruit selected for exhibiting should be free from unnatural russet and any marks, regardless of the cause, as these detrimentally affect the appearance. They should also be completely free of any insect pests such as red mite. The stalks of apples and pears should be complete and not damaged in any way. Stalks of plums and cherries should be left on the fruit.

Market Value

Market value mainly concerns exhibits of collections of plate lots and case lots and for the latter should be considered in conjunction with storage and transportation.

SCHEDULES OF STANDARD SIZES OF MAIN VARIETIES

Dessert Apples

Variety	Exhibition in.	Commercial in.	Commercial Count
Cleopatra	3	2¾	138
Cox's Orange	2⅞	2½	180
Delicious	3¼	2¾	138
Dougherty Jonathan	3	2⅝	150
Frimley Beauty Gravenstein	3¼	2⅞	113
Golden Delicious Granny Smith Kidds Orange Statesman Sturmer Staymans Winesap	3⅛	2¾	138
Rome Beauty	3⅛	2⅞	113
Tasma	3⅜	2⅞	113

Culinary Apples

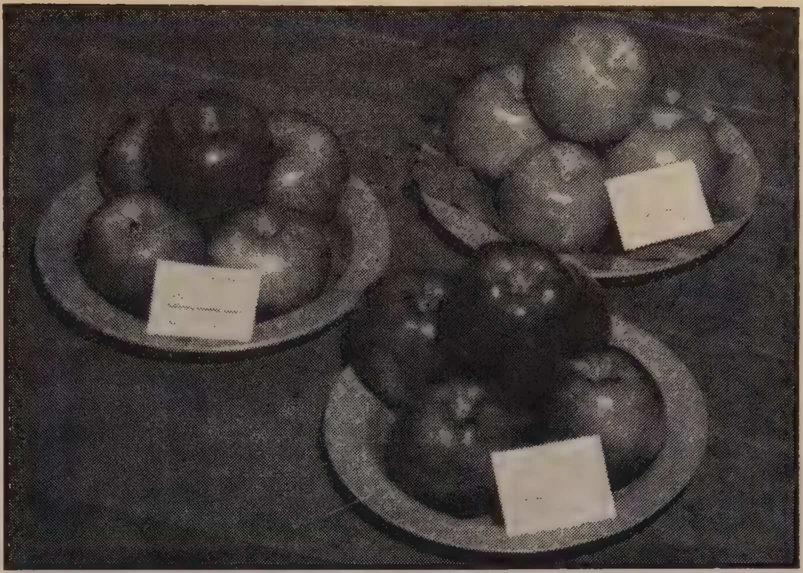
Variety	Exhibition in.	Commercial in.	Commercial Count
Alfriston Dunns Favourite Mobbs Royal Reinette du Canada Tasma	3½	3	96
Ballarat	3⅝	3	96
Prince Alfred	4	3	96
Granny Smith Lord Wolseley Rome Beauty Rymer	3¼	3	96
Cleopatara Sturmer Washingtoı	3¼	2⅞	113

Dessert Pears

Variety	Exhibition in.	Commercial in.	Commercial Count
Beacon Beurre Bosc Conference Doyenne du Comice Josephine de Malines Marie Louise	2¾	2½	135
Williams Bon Chretien	2¾	2½	135
Beurre Capiaumont ..	2½	2¼	180
Broompark	2¾	2⅜	165
Louise Bonne de Jersey	3	2½	135
Packhams Triumph Winter Cole Winter Nelis	2⅝	2⅜	165

Culinary Pears

Variety	Exhibition in.	Commercial in.	Commercial Count
Beurre Capiaumont ..	2¾	2½	135
Beurre Diel	3½	3	90
Beurre Clairgeau Beurre Bosc Conference Keiffer P. Barry Vicar of Winkfield	3¼	2¾	110



The two exhibits on the right are of a high standard for show fruit. The exhibit on the left is marred only by lack of uniformity of colour.

In single-plate entries competition is between entries of one variety, but in collections of plate lots it is between different varieties, and relative market values then become important.

Market value is judged by the popularity of the varieties on the home or export markets, depending on the class in which the exhibit is entered and the condition of the fruit at the time of showing.

Fruit in Cases

Fruit packed in cases for exhibiting should conform to the conditions already given regarding size, uniformity, form, appearance, and freedom from blemish, and in addition the following factors should be considered:—

Storage, Transportation, Market Value

As well as its market value the condition and maturity of the fruit are important. These would be judged on the suitability of the fruit at the time of exhibiting for the class in which it is entered.

Packing

If the fruit is to be wrapped, this should be done neatly with no paper ends showing.

Correct and even sizing is essential to pack the fruit to the correct height and degree of compactness that will prevent movement in any direction.

The height of the fruit should be such that at the lid-top centre ½ to ¾in. bulge will show when thick bottom and thin lids are used, and ½ to ¾in. bulge top and bottom when thin bottoms and thin lids are used.

When thick bottoms and lids are used in packing stone fruit the fruit should be packed firmly to prevent any movement and only to the level of the top of the case.

The alignment of the fruit should be such that the rows are perfectly straight when looked at in any direction.

Appearance of Package

Clean, neatly constructed packages with timber sizes conforming to specifications should be used. Nails should be properly spaced and driven home without showing hammer marks. Case liners should be correctly and neatly fitted. Branding or labelling of the cases should be carefully done to prevent smudging or damage.

The condition of the package, though not as important as other factors, may decide the winning or losing of an award.

Scale of Points

The relative values of the requirements outlined can best be illustrated by the judging score tables below and on the next page, which show the percentage points allocated for each.

When score cards are used full points are allotted only for perfection, and points will decrease as the exhibit varies from perfection in any one of these factors.

POINTS ALLOCATION FOR APPLES

Plate Lots

	Single plate lots		Collection of plates	
	Dessert	Culinary	Dessert	Culinary
Size and uniformity	15	15	15	15
Form	5	5	5	5
Condition and flavour ..	30	—	20	—
Condition and cooking quality	—	40	—	30
Colour and appearance ..	35	25	25	15
Freedom from blemish ..	15	15	15	15
Market value	—	—	20	20
	100	100	100	100

POINTS ALLOCATION FOR APPLES AND PEARS

Cases

Form and size	10
Storage, transportation, and market value	20
Condition, quality, and appearance ..	20
Uniformity of sizing and grading ..	20
Wrapping, height, alignment, and compactness	25
General appearance of package ..	5
	100

POINTS ALLOCATION FOR PEARS

Plate Lots and Collection of Plates

Form, size, and uniformity	15
Quality and flavour	25
Condition and appearance	20
Market value	20
Freedom from blemish	20
	100

Stone fruits have not been included in the Standard Rules for Judging, but the following points allocation will serve as a guide in selecting these fruits for exhibiting.

POINTS ALLOCATION FOR STONE FRUITS

	Plums	Peaches, nectarines, apricots, cherries
Size	20	15
Form	5	5
Uniformity	10	10
Colour and appearance	25	30
Freedom from blemish	15	15
Condition and quality	25	25
	100	100

Important Requirements

The selection of fruit for show exhibiting should begin during the growing season. Full attention must be given to spraying to prevent any marking by pests and diseases. Fruit should be well thinned. It may be found that an extra thinning late in the season would be helpful in assuring that the required size is obtained and to allow maximum colour development and prevent damage by rubbing.

When fruits are being picked for shows those selected should be as near to the size requirements as possible. To obtain an exhibit of the best quality possible a fairly large number should be picked for selecting. Other points to observe are:—

Fruit showing blemish should be put aside.

Those having best colour and appearance should be picked out.

Sizes should be checked and those fruits nearest the size required should be sorted out. These should be sorted for the most uniform exhibit.

Fruit must be handled carefully to prevent bruising or other damage.

All exhibits should be correctly and distinctly named.

The conditions and requirements for the class in which fruit is exhibited should be strictly adhered to. Schedules should be carefully read.

References

"Official Judging Rules and Guide to Exhibitors", by the Royal New Zealand Institute of Horticulture. December 1950.

"Standard Rules for Judging Apples, Pears, and Citrus Fruits", by W. K. Dallas, 1938.

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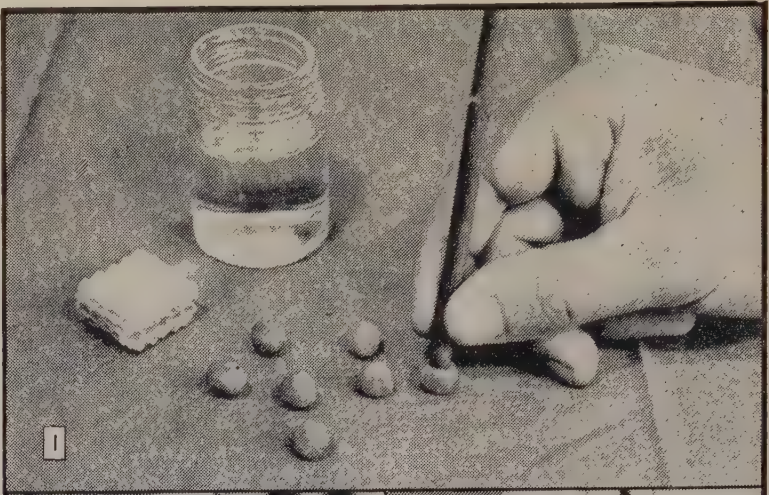
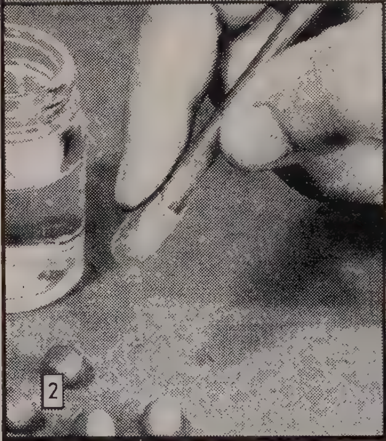
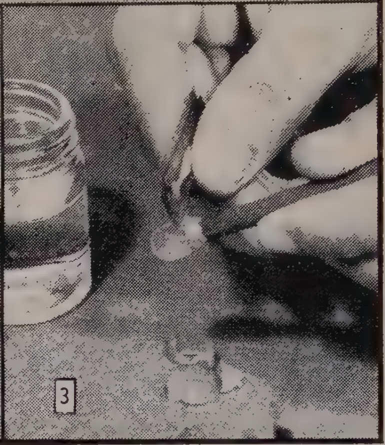
Preparing Artificial Cell Cups







SEVERAL methods are employed in the making of artificial cell cups, the first stage of most queen-rearing programmes, but though some are satisfactory, others are slow and require a considerable amount of patience. Cups of the right shape and size must be moulded, as these features have an important bearing on cell acceptance. The cell built by the bees is large inside and has a small mouth. However, it is not practical for the beekeeper to make them of this shape. If melted wax is required for making cups, difficulty may be experienced, because if the wax is allowed to become too hot, a suitable base for the cell cup cannot be formed and if the wax is too cold, the cup is lumpy and tends to break up. For the method to be described unmelted wax is used.

The method involves the use of a moulding stick, which should be made from a piece of hard wood, a meat skewer being satisfactory. The length of the stick is immaterial; usually it can be about 6in., the end portion ⅜in. in diameter with the point rounded off.

From a sheet of comb foundation wax pieces about 1in. square are cut and these are allowed to become slightly softened by the sun or by warming near a stove.

Each piece of wax is rolled into a small ball and placed on the tip of the moulding stick, which is pressed down to flatten the wax out (Fig. 1). The overlapping wax is smoothed round the end of the stick with the index finger (Fig. 2). Surplus wax is cut off about ½in. from the end of the cup with a sharp knife or razor blade (Fig. 3).

The cup should be removed with a twisting motion, and will come away more readily if the moulding stick is dipped in water before coming into contact with the wax, thus preventing wax from adhering to the stick.

When sufficient cell cups have been prepared they should be waxed on to the top bar of a frame and placed in a hive for cleaning.

—*T. P. J. WILLIAMS, Apiary Instructor,*
Department of Agriculture, Hamilton

Lambing Estimates for 1952 Season

The estimated lambing percentage of the Dominion for the 1952 season is 94.68, a rise of .14 per cent. on that for the 1951 season. The total breeding ewe figure for 1952 of 22,833,442 is the highest on record. In the following tables, contributed by the Animal Industry Division, county breeding ewe figures had to be estimated, as breeding ewe figures for only the North Island, South Island, and the Dominion were available.

AUCKLAND DISTRICT

County	Breeding ewes (as at 1952)	Estimated percentage of lambs	Estimated number of lambs
Mangonui	30,253	83.0	25,110
Whangaroa	14,747	90.7	13,272
Bay of Islands	65,671	95.4	62,650
Hokianga	43,344	80.0	34,672
Whangarei	93,104	84.4	78,579
Otamatea	89,197	88.0	78,493
Hobson	84,312	92.0	77,567
Rodney	100,644	90.1	90,680
Great Barrier	6,149	63.6	3,911
Waitemata	77,557	91.4	70,887
Eden	3,186	97.0	3,090
Manukau	75,857	92.9	70,471
Franklin	155,594	102.5	159,484
Coromandel	32,920	78.8	25,941
Thames	14,133	86.1	12,169
Hauraki Plains	22,085	89.4	19,744
Ohinemuri	25,041	96.5	24,165
Waikato	180,109	102.9	185,332
Raglan	482,616	99.0	477,790
Waipa	202,567	100.5	203,580
Piako	147,059	103.4	152,059
Matamata	322,964	102.5	331,038
Rotorua	131,275	99.8	131,012
Taupo	8,289	85.6	7,095
Taumarunui	115,508	90.5	104,535
Kawhia	71,140	91.9	65,378
Otorohanga	160,606	100.0	160,606
Waitomo	393,694	96.9	381,489
Ohura	121,812	92.0	112,067
Kaitieke	72,073	88.6	63,857
Tauranga	173,928	100.2	174,275
Whakatane	58,436	83.8	48,969
Opotiki	48,631	78.2	38,029
Totals	3,624,501	96.23	3,487,996

WELLINGTON-WEST COAST-WAIRARAPA DISTRICT

Clifton	94,366	92.3	87,100
Taranaki	32,447	106.6	34,589
Inglewood	58,330	99.2	57,863
Egmont	24,529	106.7	26,172
Stratford	118,170	95.9	113,325
Whangamomona	59,116	86.5	51,135
Eltham	55,899	99.6	55,675
Hawera	81,413	96.3	78,401
Waimate West	10,134	106.3	10,772
Patea	220,916	100.7	222,462
Waitotara	146.657	97.0	142,257
Waimarino	177,229	98.0	173,684
Wanganui	289,824	91.0	263,740
Rangitikei	974,920	98.0	955,422
Oroua	222,170	107.7	239,277
Kairanga	109,545	103.6	113,489
Kiwitea	253,607	93.1	236.108
Pohangina	128,569	95.0	122,141
Manawatu	154,170	105.7	162,958
Horowhenua	124,991	98.9	123.616
Hutt	68,355	88.4	60,426
Makara	45,844	87.7	40.205
Featherston	334,825	94.9	317,749
Wairarapa South	183,913	90.4	166,257
Masterton	301,131	80.8	243,313
Castlepoint	94,025	86.8	81,614
Eketahuna	141.681	81.3	115,186
Mauriceville	47,412	87.9	41,675
Totals	4.554,188	95.22	4.336,611

GISBORNE-HAWKES BAY DISTRICT

County	Breeding ewes (as at 1952)	Estimated percentage of lambs	Estimated number of lambs
Matakaoa	64,656	81.0	52,371
Waiapu	245,554	78.0	191,532
Uawa	118,558	78.1	92,594
Cook	432,349	82.3	355,823
Waikohu	347,841	83.3	289,752
Wairoa	412,959	77.1	318,391
Hawkes Bay	967,135	91.2	882,027
Waipawa	458,274	98.7	452,316
Waipukurau	150,032	98.2	147,331
Patangata	510,556	91.5	467,159
Weber	55,607	87.6	48,712
Dannevirke	301,555	95.8	288,890
Woodville	92,497	97.8	90,462
Pahiatua	164,324	92.4	151,835
Akitio	153,828	81.3	125,062
Totals	4,475,725	88.34	3,954,257

MARLBOROUGH-NELSON-WESTLAND DISTRICT

Waimea	166,268	88.8	147,646
Takaka	27,860	84.0	23,402
Collingwood	13,574	82.0	11,131
Buller	1,442	90.0	1,298
Inangahua	15,857	102.5	16,534
Murchison	29,701	94.9	28,186
Grey	25,661	109.0	27,970
Westland	33,576	112.2	37,672
Sounds	95,290	73.0	69,562
Marlborough	212,162	88.0	186,702
Awatere	174,896	89.0	155,657
Totals	796,287	88.63	705,760

CANTERBURY-KAIKOURA DISTRICT

Kaikoura	118,419	70.2	83,130
Amuri	227,746	83.6	190,396
Cheviot	159,100	91.0	144,781
Waipara	297,705	100.1	298,003
Ashley	67,183	90.0	60,465
Kowhai	84,044	99.9	83,960
Oxford	74,358	89.1	66,253
Rangiora	50,538	100.8	50,942
Eyre	63,421	102.9	65,260
Tawera	48,445	75.9	36,770
Malvern	147,587	100.0	147,587
Paparua	42,978	103.7	44,568
Waimairi	3,006	95.1	2,858
Heathcote	7,755	86.3	6,693
Akaroa	82.860	107.2	88,826
Mount Herbert	41,165	98.7	40,630
Wairewa	69,736	96.5	67,295
Halswell	16,772	91.8	15,397
Springs	35,079	110.9	38,903
Ellesmere	88,830	101.8	90,429
Selwyn	157,081	77.9	122,366
Ashburton	854,495	91.8	784,426
Geraldine	294,505	89.3	262,993
Levels	213,796	100.8	215,506
Mackenzie	299,297	83.0	248,417
Waimate	519.008	87.3	453,094
Chatham Islands	50,559	74.0	37,414
Totals	4,115,468	95.06	3.747,362

OTAGO DISTRICT

County	Breeding ewes (as at 1952)	Estimated percentage of lambs	Estimated number of lambs
Waitaki	462,194	95.0	439,084
Maniatoto	227,173	82.0	186,282
Vincent	230,425	84.0	193,557
Waihemo	106,848	85.0	90,821
Waikouaiti	72,890	90.0	65,601
Taieri	167,530	97.0	162,504
Peninsula	14,934	102.0	15,233
Clutha	486,870	109.0	530,688
Tuapeka	358,721	93.0	333,611
Bruce	258,102	100.0	258,102
Lake	134,537	76.0	102,248
Southland	2,061,617	114.0	2,350,243
Wallace	683,189	96.0	655,861
Stewart Island ..	2,243	81.0	1,817
Totals	5,267,273	102.25	5,385,652

DISTRICT ESTIMATES

Auckland	3,624,501	96.23	3,487,996
Gisborne - Hawkes Bay	4,475,725	88.34	3,954,257
Wellington - West Coast-Wairarapa	4,554,188	95.22	4,336,611
Marlborough - Nelson-Westland	796,287	88.63	705,760
Canterbury-Kaikoura	4,115,468	95.06	3,747,362
Otago	5,267,273	102.25	5,385,652
Dominion ..	22,833,442	94.68	21,617,638

Dominion Totals

The following table shows the estimated lambing for the North and South Islands for the previous 5 years together with the actual number of lambs tailed:—

Year	Number of breeding ewes (*as at 1950)	Estimated percentage of lambs	Estimated number of lambs	Actual No. of lambs tailed
NORTH ISLAND				
1952 ..	12,654,414	93.08	11,778,864	—
1951 ..	*12,181,797	92.12	11,221,453	Not available
1950 ..	12,181,797	94.04	11,454,372	11,722,316
1949 ..	12,027,414	94.55	11,371,834	11,702,479
1948 ..	11,821,596	89.43	10,572,444	10,830.868
1947 ..	11,696,313	92.47	10,814,554	11,250,554
SOUTH ISLAND				
1952 ..	10,179,028	96.66	9,838,774	—
1951 ..	*9,699,670	97.59	9,465,829	Not available
1950 ..	9,699,670	97.65	9,471,747	9,516,145
1949 ..	9,472,289	98.93	9,370,665	9,467,367
1948 ..	9,233,886	96.93	8,950,202	8,975,017
1947 ..	9,047,469	93.94	8,498,971	8,584,492
DOMINION				
1952 ..	22,833,442	94.68	21,617,638	—
1951 ..	*21,881,467	94.54	20,687,282	Not available
1950 ..	21,881,467	95.64	20,926,119	21,238,461
1949 ..	21,499,703	96.48	20,742,499	21,169,846
1948 ..	21;055,482	92.72	19,522,646	19,805,885
1947 ..	20,743,782	93.11	19,313,525	19,835,046

A Survey of the Trade in Dairy Produce

"DAIRY PRODUCE, 1952"*, published recently by the Commonwealth Economic Committee, illustrates how the reversal in the upward trend in milk production in many countries in 1951 was reflected in a serious fall in butter supplies, which continued in 1952. The decline in exports of butter is also attributable to the high level of consumption in the exporting countries, not only of butter, but of fresh and processed milk and cheese. Other factors include the continued absence of supplies from the Baltic and other eastern European countries and the effects of very unfavourable weather in Australia in the 1951-52 season. The general decline in butter output has been accompanied by a marked increase in supplies of margarine and this trend has been accentuated by a fall in prices of vegetable oils while butter prices have continued to rise. Thus consumption of margarine per head in the United Kingdom reached the record figure of 18lb. in 1951, but butter consumption, at 15lb. per head, was 2lb. less than in 1950 and about 10lb. less than in 1938.

THE available figures for 1952 show that the trend toward lower milk and butter production has continued in Continental Europe, but in New Zealand, the world's largest exporter of butter and cheese, a steady increase in output has been maintained; higher milk production has also been evident last year in the United Kingdom and Canada and prospects are favourable for the 1952-53 season in Australia. United Kingdom imports of butter and cheese have been well below the 1951 level, the decline for cheese resulting mainly from the lack of currency to make purchases in Canada or the United States, and rations have been correspondingly reduced. The fall in European production and exports has served to increase the United Kingdom's reliance on Commonwealth supplies, which account for a very large proportion of its imports of dairy produce.

After a steady improvement up to 1950 world production of butter declined sharply and exports in 1951 were 30 per cent. lower than in 1938. The most serious fall occurred in Australia, where drought reduced exports to little more than 10,000 tons in the 1951-52 season as against 55,000 tons in the previous season and 100,000 tons in 1938-39; butter supplies from the main European exporters also contracted in the face of falling milk production. A further factor was a rise in consumption in the exporting countries of Australia, New Zealand, and Denmark, though in New Zealand the increase in production was sufficient to provide for an expansion in exports also. The effects of these changes on United Kingdom imports has been accentuated by the strong import demand from many European countries which are normally either self-sufficient or themselves exporters.

World production of cheese in 1951 was about 30 per cent. above the pre-war level and little change has been evident in 1952, increases in the United Kingdom and Continental Europe offsetting a decline in North America. Trade in cheese was also much larger than in pre-war years, partly because of the rise in supplies from New Zealand and Australia, but to a greater extent because of the expansion in exports of fancy cheese from Continental Europe. Much of this trade has been directed to the United Kingdom, where import restrictions were introduced earlier this year. Latest price movements for butter and cheese show a continued upward trend, which is exemplified by increases in contract prices paid by the United Kingdom to New Zealand, Australia, and Denmark. The upward trend is contrary to that for several other primary commodities, including vegetable oils, which are the main constituents of margarine.

Output of condensed milk and milk powder in most countries has remained much greater than before the war, with exports closely following the pattern of production. A rise in exports of evaporated milk (unsweetened condensed) in 1951, most of which came from the United States, was mainly attributable to defence requirements and stockpiling, while Far Eastern countries received greater quantities of sweetened condensed milk, mainly from the Netherlands. Commonwealth countries' share in production and trade in condensed milk is not large, but they are providing an increasing proportion of supplies of milk powder, which is used not only for baby food but also in the manufacture of many food products. A high percentage of United Kingdom imports of milk powder is of Commonwealth origin mainly because of the preponderance of New Zealand supplies of skimmed milk and buttermilk powders; Australia also is an important source of skimmed milk powder.

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* "Dairy Produce, 1952", published for the Commonwealth Economic Committee, by H.M. Stationery Office, price 5s. net.

N.Z. Grassland Association Conference at Timaru

THE fourteenth conference of the New Zealand Grassland Association held at Timaru during the last week of November was very largely attended at all sessions by delegates representing a wide range of interests, including a number of overseas visitors.

HEAVY rain caused the abandonment of the second farm visit that had been arranged, but there was a large attendance at the substituted programme of a quiz session and continuation of discussion on tussock grassland.

The mayor of Timaru, Mr. W. L. Richards, Mr. E. J. Henshaw, president of the South Canterbury executive of Federated Farmers, and the president, Mr. R. H. Bevin, welcomed delegates. The Minister of Agriculture, Mr. K. J. Holyoake, stressed in his address officially opening the conference the early recognition in New Zealand of grass as a crop and the importance of such conferences in the advancement of the science of pasture establishment and management. Grassland improvement, he said, offered the one sure hope of advancing the dietary standards of the world.

A list of the principal papers at the conference is given on this page. The printed proceedings of the conference, including discussion of papers and at the field day, will be available about April or May. Full members of the association are automatically sent copies of the proceedings. Others desiring them should place orders early with the secretary of the association, Box 2298, Wellington.

Conference's field day at the farm of Mr. F. R. Clarke, Levels. Upper—Inspection of the trial plots showing results of different methods of sowing pasture seed. Lower—Halt for discussion in a paddock closed for the taking of a clover seed crop. Beyond the hedge is a pea crop.

The symposium on tussock grassland and papers on molybdenum created particular interest at this conference. The projection of excellent colour slides showing establishment of clover on high country, grassland improvement on Mr. R. K. Ireland's "Ribbonwood" Station, Mackenzie Country, and molybdenum responses in North Otago lent particular value to these sessions. Runholders, research workers, and soil conservators were prominent in subsequent discussion.

In papers and discussion on molybdenum emphasis was placed on the incompleteness of knowledge yet available, the apparent need for only minimum application rates, and the wisdom of having extension advice before molybdenum is applied.

Both in the conference and on Mr. F. R. Clarke's farm at Levels keen interest, especially by farmers, was shown in the sowing of pastures with the Blackmore coulters. Indicative of the conditions under which farming under low-rainfall conditions was studied at this conference was the fact that the plot on Mr. Clarke's farm showing different methods of sowing had received nearly 8in. of rainfall in the 8 weeks since sowing out. The Downlands Water Supply Scheme and the benefits South Canterbury farming had received from its irrigation were discussed between showers that continued practically throughout the conference.

Rotations as the basis of grassland farming were the principal theme of the discussion on the farm visit and at a session on downlands farming.

Officers; Subsequent Conferences

At the annual meeting Professor A. W. Hudson (Massey Agricultural College) was elected president, with the following executive: Vice-president, Mr. G. A. Holmes (Superintendent, Department of Agriculture Invermay Research Station); immediate past president, Mr. R. H. Bevin (Chief Executive Officer, New Zealand Meat and Wool Boards' Economic Service, Christchurch); secretary, Mr. S. H. Saxby (Department of Agriculture, Wellington), Mr. L. Corkill (Grasslands Division, Department of Scientific and Industrial Research, Palmerston North), and Mr. J. E. Bell (Department of Agriculture, Auckland).

The 1953 Grassland Association conference will be held at Whangarei and Nelson will probably be the venue in 1954.

Conference Papers

“An Introduction to South Canterbury”, W. C. Stafford and R. H. Scott.

“Blind Seed Disease of Ryegrass”, P. B. Lynch.

“Control of Odontria”, J. M. Kelsey.

“Methods of Pasture Establishment”, L. W. Blackmore.

“Experimental Work on Cocksfoot Seed Production”, W. G. Thurston and J. P. Lambert.

Presidential Address, R. H. Bevin.

“The Nutritive Value of Some High-country Pasture Species”, I. E. Coop.

“The Changing Tussock Grasslands”, R. D. Dick.

“Tussock Grassland Investigation”, T. G. Sewell.

“Tussock Grassland: Marginal Land”, R. K. Ireland.

“Farming Foothill Country”, A. H. Flay.

“The Development of a Loburn Foothill Farm”, P. H. McGloin.

“Growth Habits of Short-rotation and Perennial Ryegrass”, K. J. Mitchell.

“Seeding Rates of Short-rotation Ryegrass”, R. W. Brougham.

“Molybdenum Research in New Zealand”, E. B. Davies.

“Molybdenum in North Otago”, W. R. Lobb.

“Molybdenum Responses at Invermay”, G. A. Holmes.

“Molybdenum and Legumes”, A. F. R. Adams.

“The Statistician and Pasture Trials”, A. C. Glenday.

“Storage of the Seeds of Pasture Plants”, E. O. C. Hyde.

Detusking of the Boar

REGULAR detusking of boars from the time they are 12 months old is well worth while to prevent injuries to sows or other pigs and to reduce the risk of personal accident. Simple equipment and proved methods to facilitate the detusking of boars are described in this article by A. Longwill, Superintendent, Pig Industry, Department of Agriculture, Wellington, and C. M. Bailey, Supervisor, Taranaki District Pig Council.

THE lower canines or "tusks" of the boar are permanent pulp teeth without roots of the type attaching to permanent teeth. As such they are capable of continuous growth and this growth, together with constant sharpening against the upper canine or "grinder", ensures that the tusk, once grown, is always sharp.

These sharp tusks can be a menace to man as well as to sows and other pigs. Even while a boar is quiet and apparently harmless his tusks are potential death. For that reason they should be either extracted by a veterinarian or periodically removed by means described in this article.

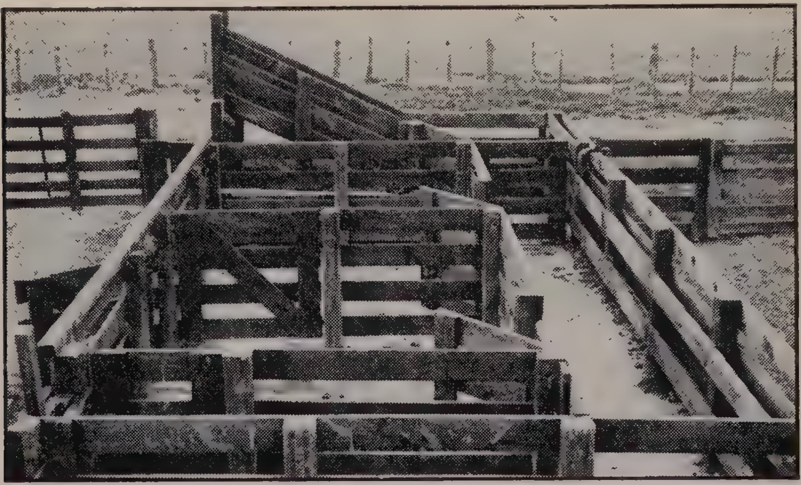


Fig. 1—Drafting and loading yards. A race with head bail is shown in the left foreground.

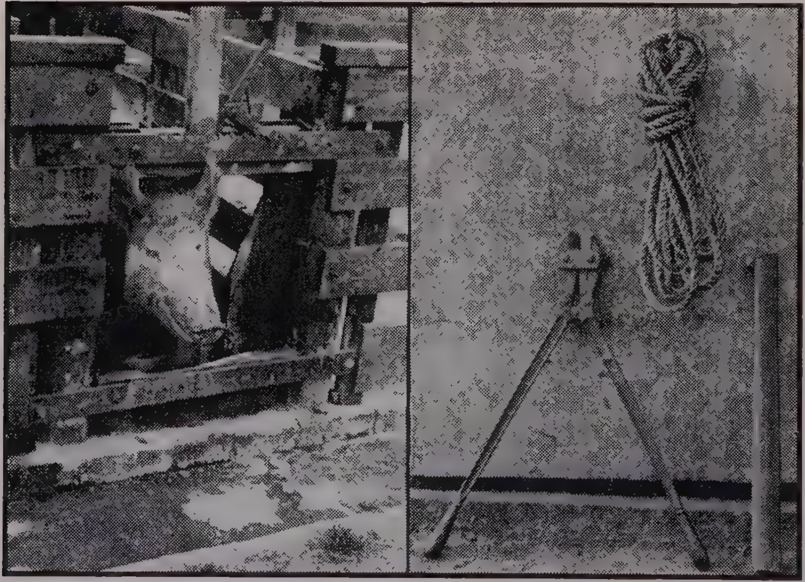


Fig. 2 (left)—An adjustable head bail which enables detusking of a boar to be done simply. A sow is shown secured for ringing. Fig. 3 (right)—Equipment necessary if no head bail is available.

The facilities which simplify what could otherwise be an awkward and messy job are:—

A yard including race and head bail in which the pigs can be handled easily and the head secured firmly, and

Simple instruments to carry out the operation.

With these facilities the job can be done single handed if necessary. The accompanying illustrations show the type of facilities and equipment within the scope of the average pig producer.

Control in Handling Pigs

Whatever the type of piggery layout, the design should include a race or system of races so that pigs may be driven from any pen to the handling yards, which, besides the race and head bail, should provide weighing, drafting, and loading facilities. (See Fig. 1.)

The head bail should be adjustable over a wide range to be capable of holding all pigs from the boar down to small stores which are to be turned out to pasture but which require ringing first. This necessitates adjustment of the movable arm of the bail at both bottom and top.

The bottom adjustment, which is generally used only when there is a change in the class (size) of the pigs being handled, is usually provided simply by a series of holes through which fits a ½in. bolt or pin holding and forming a pivot for the movable arm of the bail as shown in Fig. 2. The most convenient method of securing the "loose" end of the arm when working pigs through the bail is probably the ratchet, which is illustrated in Fig. 2.

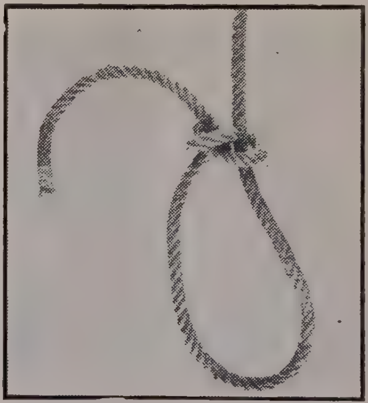
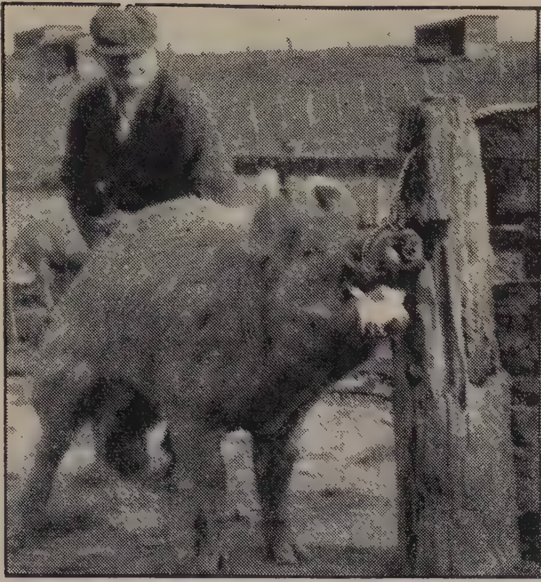


Fig. 4—The noose which is used for securing a boar during detusking.

An alternative though somewhat less satisfactory method of retaining the boar for detusking is illustrated in Figs. 5 to 9. However, provided no undue risks are taken regarding the strength of the rope used or post employed as an anchor, and the boar is tied close to the post so that it is given no slack which might allow freedom for a sudden dangerous jerk, the



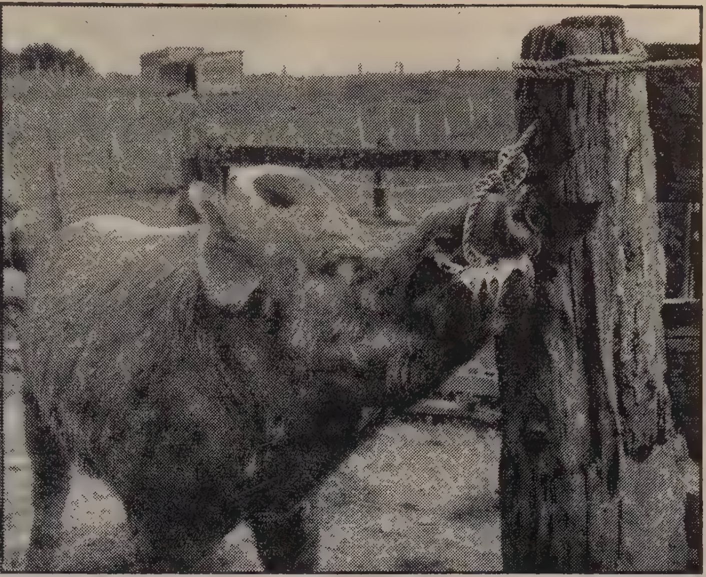


Fig. 5 (left)—After the noose has been slipped over the boar's upper jaw and tightened the boar is drawn up to a strong post. Fig. 6 (right)—The head in position for detusking. There is no play in the rope.

method should be quite safe. Where one must work single handed, however, the head bail is strongly recommended; alternatively a leg-rope should be used.

In both methods a sawn-off fork handle or similar solid piece of wood is placed through the jaws to keep the mouth open during the operation.

Use of Rope Noose

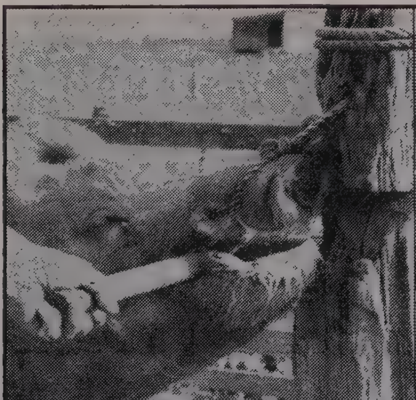
Where no head bail is available a good, strong hemp rope in which a noose is formed with a running bowline (Fig. 4) and slipped over the pig's upper jaw and tightened and which is secured to a strong post as shown in Figs. 5 to 9 will enable the job to be done satisfactorily. For added safety with this method a leg-rope may be tied on one of the boar's hind legs to prevent a forward lunge.

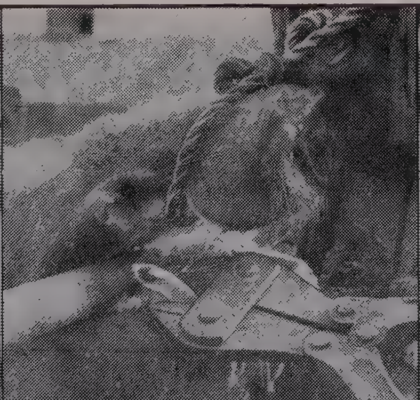
When the running bowline is tied 6 to 9in. of loose end, which can form a good hand grip in releasing the noose, should be left. The loop formed first in tying the knot should be small, sufficient only to allow the rope to run through easily. The free end of the rope is then passed through the loop and pulled through until a noose about a foot long is formed. This is slipped over the upper jaw of the boar at the trough or in some convenient pen or race where he can be approached safely.

Once it is tightened on the jaw the pig will tend to pull back and retain the tension on the rope, which is then drawn in on the anchor post until the animal's head is firmly held. The level at which the rope is tied to the post should be such that the boar's head is raised slightly, but should not be so high that there is more than 6in. of free rope between the post and jaw. When the boar's head is secured in this position removal of the tusks can proceed.

Cutting the Tusks

If a wood chisel is being used, the fork handle or other wooden block forms the double function of gag to hold the mouth open and block against which the "chop" of the chisel is effected. An assistant standing on the opposite side of the animal to the operator places the block in position hard against the inner surface of the tusk and as close to the margin of the gum as possible and prepares to give sufficient resistance to minimise jarring of the jaw when the chisel is struck. The chisel is placed firmly





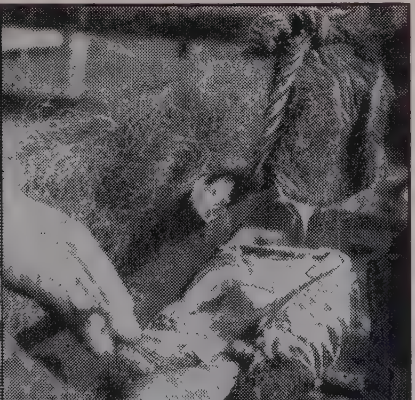


Fig. 7 (left)—The gag is placed in position and is gripped by the boar between the molar teeth. Fig. 8 (middle)—Bolt cutters in position close to the gum for cutting the tusk. Fig. 9 (right)—The operation completed. A smooth, safe stump remains in place of the tusk.

24—DETUSKING THE BOAR . . .

by the operator on the outer surface of the tusk and close to the gum and when he is satisfied that everything is ready he strikes a sharp blow with a mallet. One blow should sever the tusk. The same procedure is then followed to cut the other tusk.

Bolt cutters simplify the operation and enable it to be carried out single handed if necessary. When the boar is secured all that is necessary is to place the wooden gag well back between the molar teeth as shown in Fig. 7. The operator can place this in position himself and immediately place the bolt cutters as close as possible to the gum and cut the tusk (Fig. 8). The result will be a neat, safe stump as shown in Fig. 9. If any sharp edge is left, it should be trimmed smooth.

The operation is repeated on the other tusk. If, as in older boars, the grinders themselves have become sharpened through use to the extent that they have become dangerous, they should be cut at the same time.

There have been numerous accidents in the past through unexpected attacks or "playfulness" by boars, including cases at shows. It would be wise for show committees to insist that all boars be detusked. Boars which are docile and apparently dependable at home can become upset at showgrounds, and much damage, sometimes irreparable, is done. The only way to prevent such occurrences and to avoid accidents and injuries to other animals on the farm is to detusk the boar before the tusks become dangerous.

The boar on a farm where only one is kept should be given company and not confined to a pen entirely to himself. One or two sows at least should be left with him after mating. The company is good for the boar's temperament and it will ensure that sows which miss at one service are picked up again at the first heat.

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Radio Broadcasts

RADIO broadcasts to farmers will be given during February as follows:—

1XH Hamilton, 12.30 p.m.

5 February—"Flock Management in Autumn", by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

12 February—"Pasture Management", by H. M. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

19 February—"The Season's Outlook", by S. Smith, president, Waikato branch of Federated Farmers.

26 February—"The Future of the Y.F.C.", by the Waikato district committee of the Federation of Young Farmers' Clubs.

2ZA Palmerston North, 12.30 p.m.

2 February—"Facial Eczema", by I. M. Macfarlane, Veterinarian, Department of Agriculture, Palmerston North.

9 February—"Pasture Renewal", by F. G. Spite, Instructor in Agriculture, Department of Agriculture, Masterton.

16 February—"The Milking Shed", by G. Purvis, Superintendent of Butter Instruction, Department of Agriculture, Hamilton.

23 February—"Y.F.C. Session", by I. G. Tabor.

3YA Christchurch

5 February (7.15 p.m.)—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Fields Instructor, Department of Agriculture, Rangiora.

16 February (12.20 p.m.)—"Autumn Work with Fowls", by C. Goldsmith, Poultry Instructor, Department of Agriculture, Christchurch.

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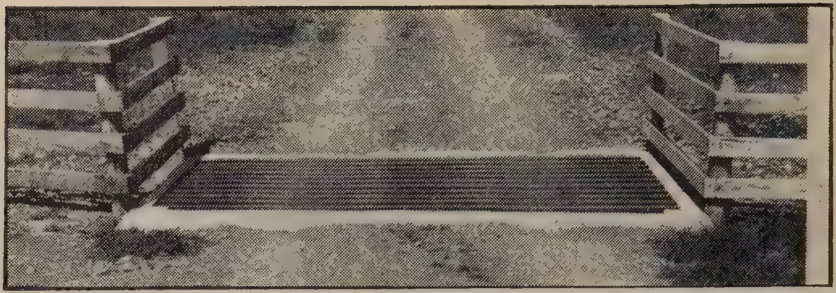


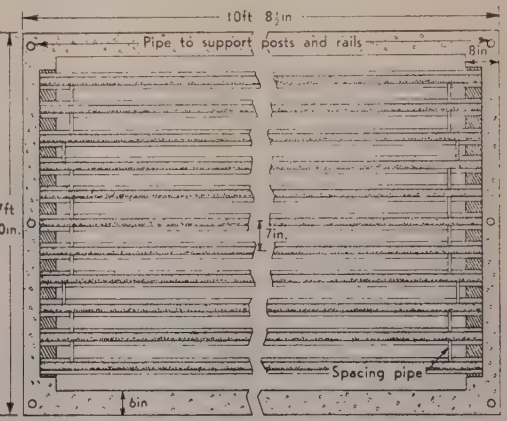
Cattle Stop with Removable Rails

By G. L. WICKENDEN, Sheep and Wool Instructor, Department of Agriculture, Wellington

A CATTLE stop of railway irons and concrete that is rigid yet from which the railway irons can be removed is illustrated. There are eleven 10ft. lengths of railway irons spaced on 7in. centres, which gives about 4½in. spaces between the irons at the top.

The railway irons are assembled in three units, two outside ones each of three irons and a central one of five. The irons in each unit are bolted together 6in. from each end with ⅜in.-diameter bolts, which pass through short pieces of ⅜in. pipe that act as spacers. The two outside units are bolted to the centre unit of five rails with short bolts through spacer piping. The 11 rails then form a rigid whole. The reason for having the rails in three units is that if the cattle stop has to be cleaned, only one section need be lifted.

The railway irons are supported at each side on 8in.-thick concrete walls extending about 2ft. below the road level. The rails rest on a 4in. (wide and deep) step in the concrete, and there is ¼in. play between the ends of the rails and the concrete side walls. Short, strong lengths of pipe built into the side walls on an angle outward support posts and rails. There are strips of rubber between the railway irons and the concrete on which they rest to cushion shock to the concrete from traffic.



At each end of the cattle stop pit is a concrete wall about 6in. thick. These walls are slightly higher in the centre than at the sides to conform with the camber of the road, and they have aprons of concrete spreading outward on to the road. The pit is 6ft. 9in. long, this distance being considered the minimum that will be effective.

No central concrete walls are necessary, as loads are carried near the sides and the rigid railway irons give adequate support.

The cattle stop is very neat and on the one illustrated there has been no cracking of concrete such as often occurs where iron or boiler tubing is set into concrete. There are no rattles or bumps when a vehicle is driven over the stop and it has been stockproof.

Below—Showing how rails fit into step in concrete side wall.

Brassicas in the Home Garden

AMONG the members of the genus *Brassica* are a number of species cultivated as food for man. Cabbages, cauliflowers (including broccoli), and brussels sprouts are far the most important for the home garden. In New Zealand they are grown in both islands in a wide range of soils and conditions. Although these vegetables are not particularly alike in appearance, cultural methods are very similar and a brief description of the principal features of cultivation is given by W. G. Crawford, Horticultural Instructor, Department of Agriculture, Oamaru, in the first section of this article. The second part, on garden work for the month, is by C. L. Napier, Horticultural Instructor, Department of Agriculture, Hastings.

AS with most other vegetables fresh, plump, disease-free seed with high germination capacity is essential for good results. Seeds of most vegetable members of the genus *Brassica* retain viability for only 4 to 5 years. Old seed usually produces weak seedlings which lack resistance to soil-borne and air-borne diseases and seldom develop into healthy, vigorous plants.

It is advisable to treat all seed with a good proprietary dust before sowing to inhibit harmful seed-borne and soil-borne organisms.

Seed-beds

Successful raising of brassica plants depends on their initial treatment in the seed-bed, and careful attention at this stage is well rewarded. In the seed-bed good drainage and good physical structure of soils are required. Soils which tend to cake easily should be avoided; otherwise many of the delicate plants may be lost in their attempt to break through the hard surface layer. All brassicas have a fairly high lime requirement, and working of calcium carbonate into the seed-bed is usually beneficial; 3oz. per square yard is usually sufficient. Well-decomposed organic matter incorporated into the seed-bed improves its structure and aeration.

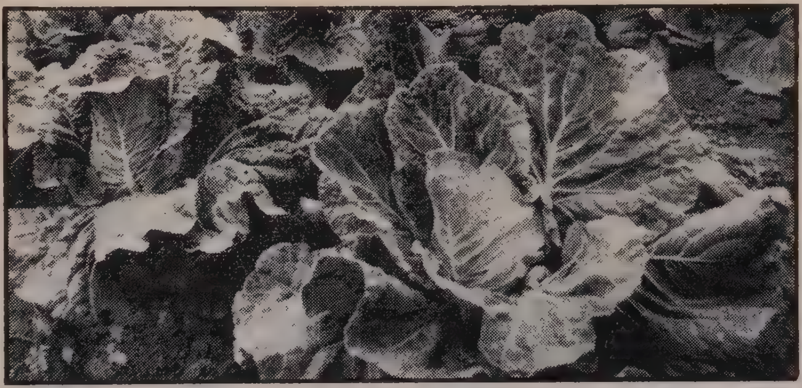
The application of phosphatic fertiliser at 1½ to 2oz. per square yard of seed-bed will tend to stimulate bacterial action and encourage root growth.

Nitrogen will stimulate stem and leaf development, but is best added after germination has taken place.

Seed should not be sown when the soil is excessively wet. Cold soils with poor aeration inhibit germination and encourage development of parasitic fungi and bacteria. The soil should not be allowed to dry out after seed has been sown. Most brassica seed sprouts readily, and if plants do not appear within 5 days, a close examination of the seed-bed should be made to ascertain why germination has not taken place.

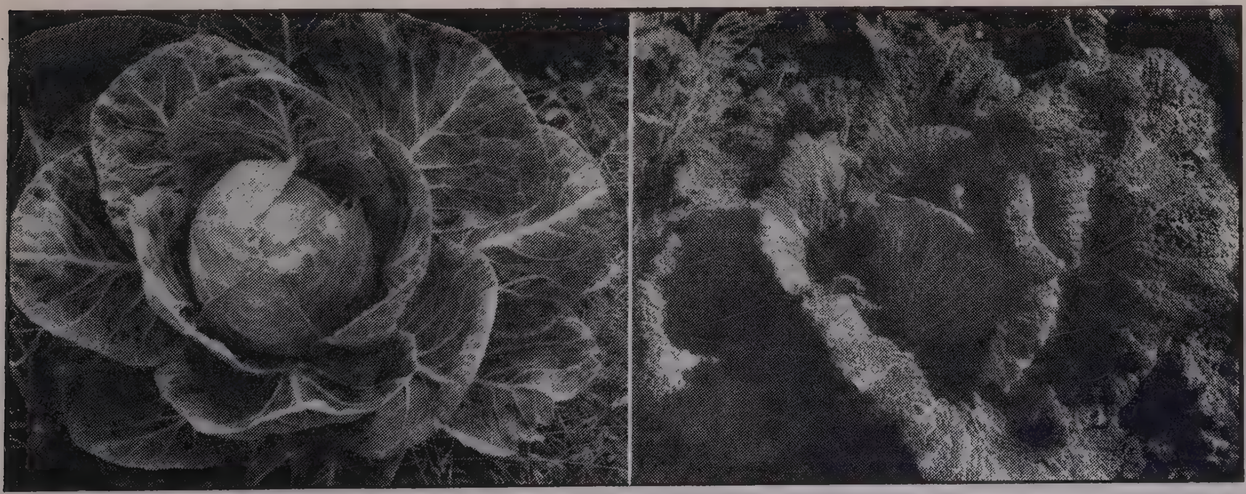
It is essential that plants should receive as little check as possible at transplanting. This is particularly important with cauliflowers and may make all the difference between success or failure of the crop.

When land is being prepared for the transplanting of brassicas it should be borne in mind that the crop may be in the ground for from 3 to 10 months. Every care should be taken to ensure satisfactory results. If the land to be used is carrying a green crop, this should be turned in some time before to ensure that the bacteria breaking down the organic matter will not compete with the young plants for nitrogen. The time required for this decomposition will depend partly on the type of material being turned under and partly on the character of the soil and its supply of moisture. Fibrous material such as straw or mature lupin stems will require longer than young, succulent stands of lupins, mustard, or oats. Similarly crops turned under during summer will decompose more rapidly than during winter. Brassica crops are not very satisfactory for green manuring and should never be used if plants of the same genus are to form the succeeding crop.



[*Sparrow Industrial Pictures Ltd. photo.*

Above—Pointed, spring-type cabbage. Below left—Round-headed, summer cabbage. Below right—Savoy (winter) cabbage.



[*Green and Hahn Photography Ltd. photos.*

In general, brassica plants are deep rooting and the soil should be well worked to a depth of 10 or 12in. The time and type of working given a soil will depend on its character and texture. Heavy clay soils should never be worked wet, as puddling and caking will almost certainly be the result. They are best turned under well before planting time, preferably in autumn, and allowed to lie fallow to destroy weeds and to allow rain and frosts to improve their structure. On the other hand, light-textured soils can be worked at almost any time without the danger of conversion to a poor physical condition.

Varieties to Plant

Cabbages and cauliflowers can be grown for most of the year in many parts of New Zealand. Different varieties are used in different districts and broad recommendations are set out in the table below. Home gardeners should also be guided by local preferences.

Brussels sprouts on the other hand can be grown successfully only during certain months of the year. Early January is the best time for planting out the seedlings. Only a limited number of varieties are available. Taller types usually yield more heavily than dwarfs. The latter are used for hill planting and on land subject to high winds. Frost during the growing period tends to improve the quality of the crop.

Transplanting

Thorough watering of seed-beds before transplanting of seedlings will facilitate lifting and reduce root damage. As much soil as possible should be retained on the roots. Only stocky, well-developed plants free from diseases should be planted out. Undersized, poorly developed, or leggy plants seldom produce good crops. Do not lift more plants than can be conveniently transplanted immediately. Damping of foliage with a fine mist spray will reduce transpiration and prevent wilting. Straight rows make weeding and management easier. To reduce erosion they should run across the slope rather than with it; also it is advisable to run them north and south to avoid shading effects.

Transplanting is best carried out in the late afternoon and should be avoided on hot or windy days.

Holes for planting should be made with a trowel and be sufficiently deep and wide to allow proper root spread. Dibbles are often used, but holes so produced are firm sided and do not allow easy root penetration, and unless care is taken to firm the plants properly air pockets may be left round the roots. In clay soils such pockets tend to hold water and make ideal sites for fungous development.

Varieties of Cabbage and Cauliflower for Various Districts

CABBAGE

	Northland, Auckland	Waikato, Bay of Plenty, Gisborne, Hawkes Bay, Taranaki	Manawatu, Wairarapa, Wellington, Nelson	Marlborough, Canterbury, North Otago	South Otago, Southland
Spring	Jersey Wakefield, Golden Acre, Green Acre	Flower of Spring, Jersey Wakefield, Enfield Market	Flower of Spring, Enfield Market	Flower of Spring, Enfield Market	Flower of Spring, Enfield Market
Summer	Enfield Market, Golden Acre, Green Acre, Henderson's Succession	Golden Acre, Henderson's Succession	Golden Acre, Copenhagen Market, Henderson's Succession	Golden Acre, Copenhagen Market, Henderson's Succession	Golden Acre, Copenhagen Market, Henderson's Succession
Winter	Golden Acre, Henderson's Succession	Henderson's Succession, Savoy Drumhead, Savoy Omega	Savoy Drumhead, Savoy Omega	Savoy Drumhead, Savoy Omega	Savoy Drumhead, Savoy Omega

CAULIFLOWER

North Island

	Time to maturity months
Early London	3½
Walcheren	4
Phenomenal Early	4
Roscoff No. 1	3½
Roscoff No. 2	4
Roscoff No. 3	5
Roscoff No. 4	6
Phenomenal (5 months)	5
Phenomenal (6 months)	6
All Year Round (south of Hamilton only)	4

South Island

	Time to maturity months
Early London	4½
Roscoff No. 1	4
Roscoff No. 2	5½
Roscoff No. 3	7½
Phenomenal (5 months)	9
Winter Mammoth	4½
Lily White	6
Veitches Self-protecting	7½
Superb Early White	7
Snow White	8
Late White	9
Latest of All	10

Seedlings are best set out about 1in. deeper than their previous seed-bed level and should be watered soon after setting out to settle the soil round the roots.

Care should always be taken that the plant does not lack moisture during the critical stage between the time it leaves the seed-bed and its field establishment. Replacements are seldom satisfactory, so every care should be taken with the initial planting out.

Fertilisers and Manures

Brassica crops are gross feeders and require good soil. The addition of farmyard manure is a good means of soil improvement, for it not only supplies the elements essential for plant growth, but also organic matter, which improves the soil structure. Old stack bottom and stable manure, if available, are useful soil improvers; 2 or 3in. of such material spread evenly over the surface and hoed in will generally produce good crop responses. Strawy material, lawn clippings, leaf mould, and the like will tend to open up the soil. They should be incorporated some time before planting and allowed to decompose. The addition of a small amount of sulphate of ammonia, nitrate of soda, or blood and bone at this stage will materially hasten decomposition. Stable manure is scarce and commercial fertilisers must be used by most gardeners.

Brassicas have high nitrogen, phosphate, calcium, and magnesium requirements.

Blood and bone usually contains about 12 per cent. of phosphate and 7 per cent. of nitrogen and is particularly suitable for fertilising brassica crops. Its chief advantage over sulphate of ammonia lies in the slower release of nitrogen in a form readily available to the plant. Sulphate of ammonia is ideal for forcing growth. The feeding of excess nitrogen in home gardens in the Dominion is rare. Serpentine superphosphate contains magnesium in addition to its phosphate content and is strongly recommended for brassicas.

Potash improves the quality of all vegetables.

As the fertiliser requirements of brassica crops will vary with the district, topography, and other factors, no hard-and-fast programme can be laid down. A good general mixture for home gardens would contain 1 part of potash, 4 parts of serpentine superphosphate, 3 parts of blood and bone, and 1 part of sulphate of ammonia by weight, applied at 4oz. per square yard.

Correct placement of fertiliser is important. Broadcasting is wasteful, as much of the manure applied is not readily accessible to the plant. Incorporation of two-thirds of the total fertiliser within the soil immediately below the root system of the plant before planting is ideal. The remaining third is best applied as a side dressing with the first hoeing for weed control about a month after planting out.

A side dressing of sulphate of ammonia at ½oz. per square yard for cauliflowers a few weeks before curd formation and for cabbages at the half-grown stage will usually give good results.

Cultivation

Provided the ground for the brassica crop has been well prepared, there is no need for deep cultivation during the growing period. Frequent shallow cultivations will destroy weeds without unduly injuring the crop's roots. Weeds should be killed in their early stages and never allowed to develop woody roots. Hilling the crop has much to recommend it, particularly in districts with high winds. It is best done when the crop is young and before surface roots are spread far enough to be damaged in the process.

Diseases and Pests

Brussels sprouts, cabbages, and cauliflowers are all subject to the same diseases and pests, and in the main can be treated as one crop as far as their control is concerned. Only the principal troubles likely to be encountered are mentioned here.

Bolting or premature shooting to seed is a physiological trouble attributable to a number of causes. "Bolters" are usually more vigorous than other more desirable seed plants in a crop and often produce much more seed. Tendency to bolt is a hereditable character and unless seed growers eliminate plants exhibiting this character from their crops, a high percentage of undesirable plants may be a feature of the progeny.

Again, the normal function of any plant is in the main to reproduce itself, and any check to normal growth such as an abnormally dry spell may bring about early seed-head development. Moisture-loving or cool-season varieties if planted during the dry summer will almost invariably bolt to seed.

[*Green and Hahn Photography Ltd. photo.*

Brussels sprouts can be grown successfully only during certain months of the year. Early January is the best time for planting out seedlings.

Whiptail is a nutritional disease common in cauliflower crops in many parts of New Zealand. It is also present, with less spectacular symptoms, in cabbages and brussels sprouts. Plants affected are characterised by long, narrow, distorted leaves often deeply cut to the midrib. In extreme cases incurling of the margins similar to the condition caused by aphis injury is visible. Although most cauliflower varieties are susceptible, the slow-growing, long-season types are usually more severely affected than short-season types. Cold, excessively wet weather or drought conditions accentuate the trouble.

The primary cause is a shortage of available molybdenum in the soil and the disease is usually associated with acid conditions.

To control whiptail growers are advised to reduce soil acidity by heavy lime applications and so increase the availability of what little molybdenum is present in the soil and also to treat the seed-bed with a molybdenum salt. One ounce of sodium molybdate per 10 sq. yds. of seed-bed, applied in solution 2 weeks after seeding, will enable the seedlings to take up sufficient molybdenum for normal growth. Sodium molybdate dissolves slowly and is best left overnight so that the maximum amount can be taken into solution.

Club root (*Plasmodiophora brassicae*) is a fungus which attacks other cruciferous plants such as wallflowers, stocks, and wild radish, as well as brassicas. Affected plants are characterised by distortion and knot-like swellings on the roots. The plants become yellowed, and unthrifty, and make very little growth.

Fungal spores germinate in the soil and enter the plant through the epidermal cells of the root. On the death of the root, spores are liberated in the soil and are able to move freely in the moisture surrounding its particles. Where preventive measures have not been taken serious losses of brassica crops may result, and the following precautions are recommended.

1. As wet and acid conditions favour the fungus, improvement of drainage and addition of lime to acid soils will tend to alleviate conditions conducive to the organism's development.

2. Practise crop rotation as far as possible, allowing a long interval between the growing of susceptible host plants.

Summer variety of cauliflower planted as a winter crop. The plants have gone to seed. [*Robertson photo.*

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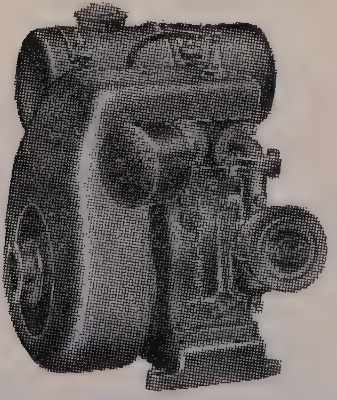

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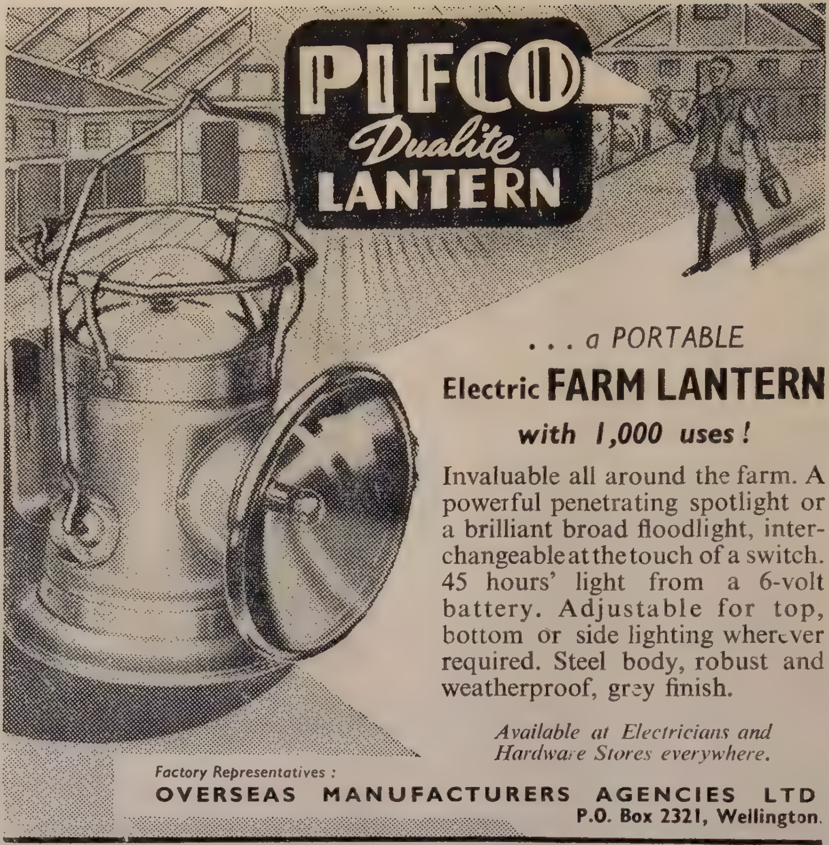

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3. Examine all plants at transplanting time and burn all seedlings if infection is suspected.

4. Burn all plants found to be infected in the garden and water the holes from which they are removed with formalin or mercuric chloride (corrosive sublimate) solution.

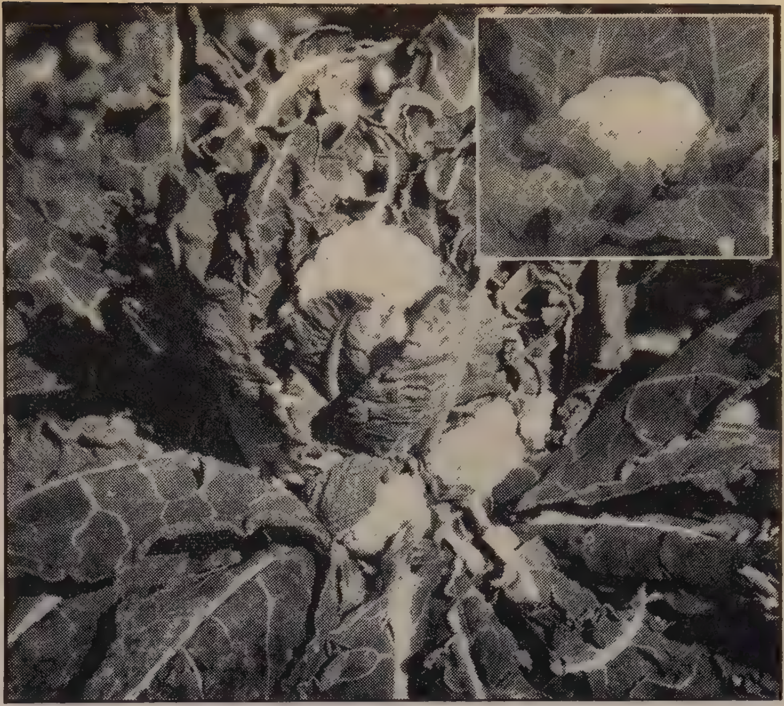
5. Treat brassica seed-beds with either the formalin solution or the mercuric chloride solution described here. For the formalin solution use 1 part of commercial formalin to 50 parts of water applied at 1 gallon per square foot. Cover the soil with wet bags and leave for at least 12 hours to allow thorough penetration of the formalin.

Formalin fumes are toxic to plants and treated areas should be thoroughly dug over before seed sowing to ensure that all formalin has escaped.

The acidulated mercuric chloride solution is prepared by dissolving 1oz. of mercuric chloride in 1lb. of commercial hydrochloric acid and adding this to 12½ gallons of water. The seed-bed is drenched with the solution (2 gallons per square yard) 10 days before seed planting.

Mercuric chloride corrodes metals, and solutions should be prepared in wooden or enamel vessels. It is very poisonous to humans. White of egg is an antidote.

White butterfly (*Pieris rapae*): The caterpillar of this butterfly feeds on the leaves of brussels sprouts, cabbages, and related plants. It may be up to 1¼in. long and is dull velvety green with an orange stripe down the middle of the back. The pest is more troublesome in hot, dry weather and, if not treated, may remove most of the leaf material. Two per cent. D.D.T. dust or 5 per cent. D.D.T. wettable powder applied at 7- or 10-day intervals usually gives effective control.

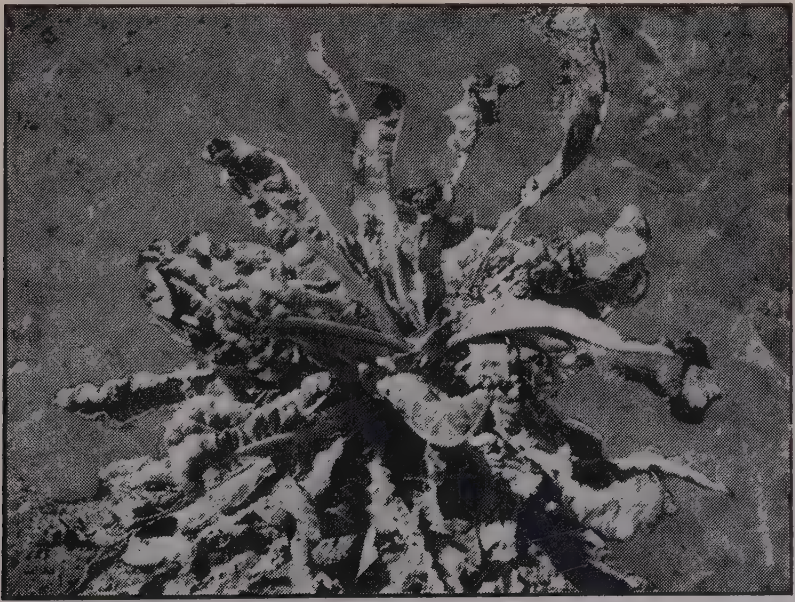


[*Robertson and (inset) Sparrow Industrial Pictures Ltd. photos.*

Plant from poor strain of cauliflower seed; leaves are breaking through the curd. Inset—The large, tight curd of a plant from good seed.

Diamond-backed moth (*Plutella maculipenis*) also causes considerable damage to brassica crops. Control measures as for white butterfly are effective.

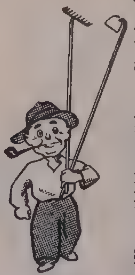
Cabbage aphis (*Brevicoryne brassicae*) causes damage to brassica crops in most parts of New Zealand. Colonies of insects feeding on the young leaves cause distortion and give shoots a greyish appearance. Nicotine sulphate applied at 1 part to 800 parts of water (3/5 fl. oz. to 4 gallons) plus 2 to 3oz. of soft soap per 100 gallons of solution as an activator and spreader or hexa-ethyl tetraphosphate at 1 : 600 strength will give good control. Both these chemicals are poisonous and should be handled with care.



[*Robertson photo.*

Whiptail disease on cauliflowers. Note the distorted, strap-like leaves.

Work for February



DURING February most gardens will be providing a variety of summer produce and also be planted to important winter crops, which will need constant attention. February can be considered a "harvesting month", because not only is fresh produce gathered but crops such as onions and roots which will be stored for the winter are lifted.

Summer Crops

As crops mature they should be harvested. Regular harvesting of beans, peas, and tomatoes extends the growing season of these crops. Tomatoes have better quality when picked ripe, but beans and peas are better when picked before they are mature.

When growing conditions are good no crop should be left unharvested too long, otherwise quality will soon deteriorate. This applies to lettuces, which should not be let grow too large, and root crops such as carrots, turnips, and beetroot, which soon

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become woody if left too long in the soil. Marrows and cucumbers are best used immature, but pumpkins should be left to mature before they are stored.

In some districts, growing crops may need boosting with water and manure if they are to be a success. Liquid manure is a convenient and quick method of applying plant foods and can be made up by adding 1oz. of nitrate of soda or sulphate of ammonia to each 4 gallons of water. Animal manure (cow or horse manure) makes an ideal alternative when dissolved in water until the solution looks like weak tea. Tomatoes, cucumbers, marrows, and slow-growing leaf crops particularly benefit from liquid manuring.

Mulching of growing crops, particularly those that are shallow rooting, will assist in retaining moisture and keeping soil conditions more temperate.

Sowings

Sowings of dwarf beans (The Prince and Canadian Wonder) and peas (Greenfeast, William Massey) for autumn use should be made immediately. Such sowings are likely to be more successful in the northern part of the North Island. Other sowings can still include turnips (White Stone), beetroot (Crimson Globe, Detroit Red), radish (French Breakfast, White Icicle), mustard and cress, and lettuce.

Harvesting for Winter

Bulb crops such as onions and shallots will now be beginning to mature. Successful storage depends largely on maturing bulbs properly. Bulbs are ready to pull when the foliage begins to yellow and bend over. If the weather is fine, bulbs can be left in the open for the skins to dry off and become crisp. The bulbs should be handled carefully and only undamaged specimens with thin necks put aside for winter.

Pumpkins and squashes should be left on the vines to mature before they are harvested for storage. Potatoes which are to be stored should not be dug until all growth has stopped and the skins of tubers are firm.

[*R. W. Orr photo.*

The regular harvesting of all pods and fruits extends the fruiting life of the plants.

Winter Crops

Plantings of winter cauliflowers can be made this month and should be completed in the south by the end of the month. Phenomenal (6 months) is suitable in the North Island and Veitches Self-protecting and Winter Mammoth in the South Island. Final plantings of brussels sprouts (Fillbasket) and winter cabbages (Drumhead and Omega) should be completed this month. Silver beet is a good standby in any garden and can be sown in most districts now.

Late sowings of carrots should be made without delay and quick-maturing varieties like Early Horn should be suitable. Early sowings of prickly spinach and also of Imperial 615 lettuce, a winter variety, can be made now. Leeks should be planted out without delay as also should celery. Musselburgh is a good variety of leek and Golden Self-blanching and White Plume good varieties of celery. Plants of kohl rabi can also be set out.

Crops for Next Spring

Initial sowings of spring cabbage (Flower of Spring and Jersey Wakefield in the North Island and Flower of Spring and Enfield Market in the South Island) can be made now. Cauliflowers can still be sown in the North Island, but this should be done immediately. Roscoff and Phenomenal strains are suitable.

Other Tasks

Continual cultivation will keep weed growth down and thus conserve moisture for vegetable crops. When summer crops are finished the plots should be sown to a green crop if they are not required for immediate replanting.

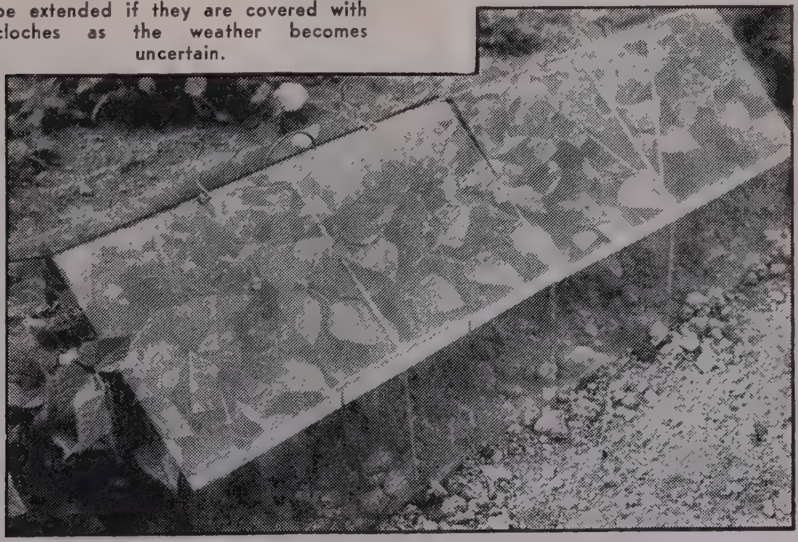
Late tomato crops may still need pruning and fixing to stakes. When the plants have reached 4 to 5ft. the tops can be pinched out.

If a surplus of beans has been grown, fresh young pods can be salted down or a portion of a row left for seed production. Late crops of carrots, parsnips, swedes, turnips, and beetroot should be thinned where necessary, care being taken to damage the remaining plants as little as possible.

Regular inspections of crops should be made for diseases and pests and immediate steps taken to control them. Any badly diseased plants should be destroyed by burning.

Autumn is a good time to begin eliminating troublesome perennial weeds. In the home garden they are best dug out as soon as plots are cleared. However, convolvulus can be checked severely by spraying it with a 2,4-D preparation, but care is needed to ensure that no damage is done to adjacent vegetable crops or those in neighbours' gardens. Several further applications of 2,4-D may be necessary during next spring and summer to eliminate convolvulus.

The season for frost-tender crops can be extended if they are covered with cloches as the weather becomes uncertain.



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Use of Buckrake for Silage Making

THE advent of the buckrake and front-end loader has resulted in renewed interest in silage making and has brought problems that make it necessary to review the making of silage in this country. A very large amount of the pasture harvested for silage last season in Auckland Province was handled by the buckrake and a few stacks were built with the front-end loader. Alarming reports of the quality of some silage made with the new equipment prompted investigations of last year's silage by Instructors in Agriculture of Auckland Province, and in this article by J. E. Bell, Fields Superintendent, and D. F. Scott, Machinery Instructor, both of the Department of Agriculture, Auckland, results are reviewed.

A tractor with a buckrake on a ramp after delivery of the load, which can be placed anywhere on the stack. After the load is dropped the tractor moves forward to get off the stack. This procedure is possible until the ends of the ramp become too steep. The sides are difficult to consolidate.

SOME interesting information resulted from the survey of 49 wedges, buns, and ramps made with the buckrake. The silage in these was compared with that in 29 trenches and pits, some of which were filled with the buckrake, and with the silage in 24 stacks weighted with earth and in 13 unweighted ones. The type of material used and the type of silage produced were noted and the wastage recorded.

Before results are considered it is advisable to study the methods of production of silage of different types and how ensiling should be carried out to produce as good a product as possible. The process of ensiling brings about considerable losses in feeding value, and even under the best conditions these losses amount to 30 per cent.

The Ensiling Process

When grass or clover is cut the plants continue to breathe, taking in air and giving out carbon dioxide. This lowers the feeding value of the plants (through loss of carbon) and produces heat. Thus a heap of cut grass soon begins to heat and sweat. If the heap is subjected to pressure so that air is restricted, the temperature rise is checked and loss of plant food thereby reduced. After a while bacteria act on the sap of the grass, converting the sugars into acids. These are not lost as plant foods, but can be utilised by the animal in the same manner as sugars. These acids have characteristic odours, which pervade the silage. According to overseas authorities it is advisable to promote the production of lactic acid, which is produced more under aerobic (where air is present) conditions and results in silage with a smell sometimes described as "fruity". The same authorities consider that making silage with a rancid smell, which is sometimes produced under anaerobic (airless) conditions, should be avoided.

Exclusion of Air

When silage is being made it is difficult to exclude air properly from stalky material made during dry, hot weather. This fact therefore usually gives rise to high temperatures and pleasant-smelling, brown silage, sometimes compared with tobacco in appearance and odour. It is very easy to exclude air from young, succulent, leafy material, and this, particularly during wet weather, is liable to give rise to low-temperature green or light-straw-coloured silage with a high moisture content and which is strong smelling. Material in between these two extremes, that is, in the flower stage, is liable to make lactic acid silage, which is slightly sour smelling, and it is considered that the aim should be to produce this type of silage.

To make stalky materials into better silage it is important to exclude air as much as possible by thorough consolidation, and harvesting should be carried out as continuously as possible. To make young, succulent, leafy material into better silage the material should be wilted, especially that placed at the bottom of the pit or stack. With young, succulent material spells of 1 or 2 days should be given between periods of harvesting, especially with unwilted material, and harvesting should be timed to take place as much as possible during dry weather.

Different Methods

Young, Succulent Material

The procedure advisable with the young, succulent material is somewhat as follows:—

1. Cut in the morning the amount of material that can be harvested next day.
2. Begin harvesting at 10 a.m. or possibly later in showery, dull weather.
3. Wait 2 days.
4. Continue the programme, cutting in the afternoon and harvesting all the material next day, beginning at 9 a.m. or earlier, spelling every second day except at the end of operations.
5. Finish the stack with fresh, unwilted material.

Little or no time is lost with this method if harvesting is carried out alternately with two stacks. Sometimes if the material is extremely sappy, three stacks can be built during the same period.

In spite of the wilting, considerable exudate will probably result. Particularly in pits it is advisable before harvesting begins to place a layer of hay at the bottom to absorb as much as possible of this valuable plant food.

Mature Material

With mature, fibrous material wilting should not be allowed; the material should be harvested as it is cut. Harvesting should proceed as rapidly as possible and the stack or pit should be covered with earth immediately after completion; a heavy layer should be added as soon as it is safe to do so.

Material in Flower Stage

Material in the flower stage is likely to produce lactic acid silage with approximately the following procedure.

1. Cut in the afternoon the amount of material that can be harvested next day.
2. Begin harvesting at 9 a.m. or earlier.
3. Wait 1 day.
4. Continue the programme of cutting in the afternoon and harvesting all the material the next day with no spells between till the stack is nearly completed.

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5. Finish the stack with fresh, unwilted material.

Earthing is not so necessary with immature material.

Unfortunately all the material cannot be harvested at the best time to produce the best silage, and with the advent of the buckrake the position will not be improved, because it is expected that more silage will be made and the harvest will be spread over several months.

Fibrous, dry material made into hay is eaten by animals only when other more appetising feed is unavailable; made into silage it is at least palatable. Because of the high wastage of this material in a stack it is best conserved in a well-constructed pit. With the buckrake and the better air exclusion obtainable with its use this material can be made into fairly good silage in a wedge, ramp, or bun on top of the ground.

Gathering and Carrying Material

Freshly cut green grass is about three times as heavy as hay. Various methods were devised for gathering and transporting this material, but it was not until the advent of the tractor sweep that it could be transported easily and rapidly. The material had still to be lifted, usually by grab lifts, on to stacks, where heavy work was required in spreading and building. The buckrake both carries and largely spreads the material and makes this work much less difficult. The front-end loader also transports and delivers the load on to a stack edge, but in large stacks some heavy work is then needed to drag the material to cover the centre of the stack. The advantages of the buckrake were speedily realised and large numbers of these were bought or made in preparation for the silage harvest last season. Some anxiety was expressed as to the type of silage which would result and the amount of wastage which would occur in the peculiarly shaped stacks that had to be made. The carrying capacity of the buckrake is not large, but if two tractors are available, one equipped with a sweep will carry loads for the buckrake to place on the stack.

Preparing the Buckrake

Before the harvesting season approaches it is advisable to check the setting of the buckrake on the tractor and this should be done on flat ground. With the rake lowered to the sweeping position, the clearance between the heel (the main beam) and the ground should be measured. This should be about 2in. or sufficient to allow the toe of a boot to be slid under the beam. This adjustment is made by altering the length of the top link of the hitch.

The points of all the tines should be in line and any bent tines should be straightened or replaced. Bent tines dig into the ground or ride over the material. Digging in can also be caused by uneven ground or having the beam too high or tines too long. Tines longer than 4ft. 6in. need a very smooth ground surface and are not recommended. When digging in does occur the machine should always be driven forward and the tines cleared before any attempt is made to raise the hydraulic lift. Tines should be free from rust, paint, or any roughness and points should be smooth to avoid catching material. Clean tines are most important when wilted material is being handled, and if trouble is experienced, cleaning of the tines with a wire brush can help.

Picking up

Picking up of material can be done material, and this too should be either across the mower swath or along the swath in the same direction as the mower travelled. If travel is in the opposite direction to that of the mower, the tines tend more to ride over the material. If a sweep is used to bring in material, too big a load should not be brought in. Splitting of heaps by the buckrake wastes time, so big loads on the sweep should be avoided unless material is being brought a long distance.

Sometimes the sweep tends to roll avoided, as it means either lumpy stacking or hard work with a fork spreading the material. Sweeping with the buckrake should be done with reasonable speed, as the speed helps to force material along the tines. As soon as the rake starts to ride over any grass the operator should stop, drive forward a few feet, and reverse again at a good speed to get well under the load again. To make stacking easier it is better to aim at a medium load rather than a huge one. Very big loads as a rule take longer to pick up and do not spread as easily as smaller loads on the stack.

Probably the most common fault in using the buckrake is to restrict the downward movement of the lift arms or to adjust the clearance between the beam and ground by restricting that movement. This adjustment should be made, as described earlier, by adjusting the top link. On some new tractors this downward movement is limited and slight alterations by filing out the stirrups on the bottom of the lift rods will make the necessary difference. It is important that the points of the tines should follow the ground surface even though the nose of the tractor may drop into a slight hollow, but if the downward movement of the lift arms is restricted, the tine points will lift clear of the ground. This can be checked on by trying the buckrake in a closely grazed paddock so that the action of the points can be seen as the tractor crosses slight undulations.

According to trials in England the maximum efficient transport distance when using one buckrake is 400 to 500yds. Beyond this distance the material handled per man hour decreased considerably. Experiments were also made using a large tractor with some 300lb. of extra weight on the front end and fitted with tines 5ft. 6in. long. It was found that this allowed cartage up to 800yds. of the same quantity of material per man hour as was carried by the conventional buckrake for half that distance. A most important weakness was that points dug in badly unless the paddock surface was very smooth, and also, as the large rake carried 8 to 10cwt. compared with 3 to 5cwt. with the conventional machine, more labour was required for spreading on the stack.

Uses of the Buckrake

The Pit

It was considered that there would be little difficulty in adapting the buckrake to the run-through pit or trench. It was thought, however, that the excessive consolidation might result in the production of extremely sour, low-temperature silage of the rancid type if young, leafy material was harvested. This did result in some instances, and with the wet season it proved difficult to wilt the material sufficiently for placing at the bottom

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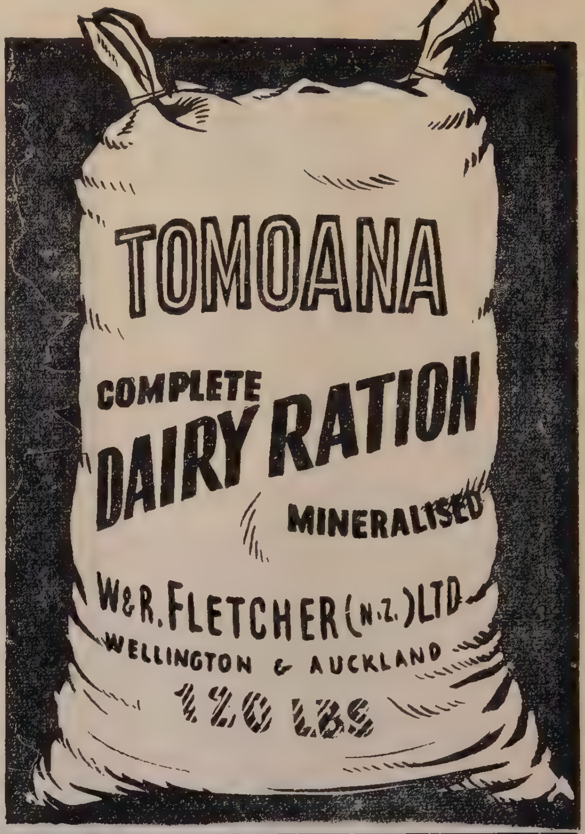
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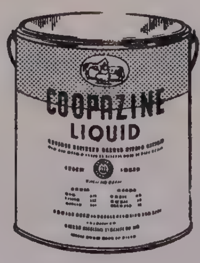
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of the pit. If it was wilted, some difficulty was experienced in picking it up. Moreover, the speedy harvesting from the use of the buckrake resulted in the silage being more sour than was normal, especially if the material was excessively consolidated by the tractor being run over it after harvesting was completed. This also occurred in clamps, with the result that the stack sank speedily until it was only about 2ft. high, and moisture could be very easily wrung out of the sour, evil-smelling material.

Loss also occurred from a practice the result of which was largely not foreseen. In pits and clamps so narrow that there was only room for the tractor to go over the material in one track, consolidation and settling were uneven and water penetrated the material, causing considerable loss and decay. It is advisable therefore for the pit or clamp to be twice the width of the tractor so that consolidation is effected evenly all over the material as the pile is being built. As in all pits and trenches, the walls should be slightly battered so that consolidation is effected right to the walls and the material as it sinks in the pit jams against the walls, completely excluding air.

Running of the buckrake and tractor across the material evidently resulted in good air exclusion, and extra running after the pit was filled was not advisable with young material, but was advisable with mature material. This extra running should be done immediately after filling is completed; otherwise the tractor wheels will not grip on the greasy surface.

An earth seal was not necessary for consolidation, but could be effective in preventing winter rains penetrating the surface and spoiling the surface layer of silage. This spoilage did not occur until after the onset of very heavy winter rains and was a greater cause of loss on the tops of uncovered pits, clamps, and stacks than decay caused by air penetration. Covering therefore appeared justifiable only to prevent rain penetration. Buckrake silage fed in summer did not really need covering.

A second attempt to make a bun after that shown in the illustration at lower left was unsatisfactory. This bun was better because the material was more mature. The area used is not very large, as the fence can be placed close to the edge of the bun.

The Wedge

Wedges were generally made on gentle slopes, as this made the approach to the stack much less difficult. The tractor and its load were backed on to the stacks and after the load was deposited the tractor would run forward. The sides should be built as perpendicular as possible. The tractor could not travel very close to the sides and consequently these did not receive as much consolidation as the centre. Because of the danger involved the resultant wastage must be borne. With wet, luscious material the ends tended to slump; with this material the ends should be built to slant inward at an angle. To assist consolidation at the ends the unloaded tractor was driven so that its front wheels approached the ends. There was considerable wastage at the sides and ends, and better building and more use of the hand fork would undoubtedly have resulted in less wastage and better-shaped stacks. There was surprisingly little waste on the tops of wedges because of the frequent consolidation received from the tractor running on and off the wedges.

One worker is necessary on the stack to trim the walls and distribute lumpy material. If earth is to be placed on the wedge, the centre should be slightly hearted. Otherwise heartening did not appear to be effective in preventing waste, as the centre was well consolidated by the tractor and did not sink as much as the material at the sides. Most of the waste at the top was caused by water penetration, which made much of the silage below the decayed silage unpalatable. This could and should be prevented either by a cover of earth or a waterproof cover. Old hay could be used. Much waste was caused by bad building.

The average measurements of the 23 wedges surveyed were 43ft. long, 20ft. wide, and 5ft. high when the wedges were fully settled on the downhill end. The estimated waste averaged 5½in. on top and 10in. on the sides. Less waste would have resulted if the stacks had been wider and not so long, but some length is necessary to obtain a safe, gentle approach. The stacks should be built fairly high to save waste, but here again the major consideration should be the safety of the operator. The estimated waste on wedges was 31 per cent. contrasted with 25 per cent. on the average unweighted stack in the survey.

Wedges have much more surface exposed than stacks and more than buns, but they are adapted admirably for building on hillsides. Elsewhere they should be replaced by buns, and, better still for safety and avoidance of waste, by trenches.

The Double Wedge or Ramp

Double wedges were built on flat land and across dry gullies or hollows.

A first attempt to build a bun, which was too consolidated. The top was chopped with discs to form a mulch seal.

A tractor with a buckrake and load on top of a bun.

Proportionately to the amount of material harvested there is less waste by the use of the double wedge or ramp than from the single wedge because of the better consolidation possible with the double wedge. If there is sufficient material to produce a ramp of reasonable height, ramps are preferable to single wedges on flat land. Less time is consumed in delivering loads, because the tractor can more often run on after delivery and backing is eliminated, except when the slope becomes too steep. The base of a ramp should be more than twice the width of the tractor wheels. As in wedges wastage in ramps was accentuated by the sides not being built straight, and this should be remedied next season. Care should always be exercised in travelling with the wheels close to the edges, especially with young, leafy material, which does not bind well. A worker is needed on every stack to build the walls properly and spread some of the material. At heads of suitable gullies double wedges or ramps can be made half-moon shape, so that one side only is exposed and the silage can be loaded on to the stack from all other directions. In other words the stack can occupy the whole of the head of a suitable gully. Where double wedges or ramps are placed across gullies, drains should be constructed to carry floor water under the silage. When ramps are being placed across gullies consideration should be given to access, especially if the silage has to be fed out in winter. Accessibility for feeding out is a very important consideration for heavy material such as silage.

Altogether full information was available from 13 ramps in the survey. The average ramp or double wedge was 47ft. long, 16ft. wide, and 4ft. high when settled. The average waste on ramps was 6½in. on top and 16in. at the sides. Better attention to building of the sides would have reduced the waste, which was excessive and estimated to be 43 per cent.

The Bun (Mushroom, Pancake, Inverted Saucer)

The type of stack (if it is entitled to that term) now to be described has various names such as bun, mushroom, pancake, or inverted saucer. Farmers usually experimented with these in out-of-the-way places so that they would not be ridiculed. However, results have been surprisingly good. Certainly with this method a great amount of surface is exposed, but it is less than in a wedge or ramp containing the same quantity of material, though 25 to 55 per cent. more than in a round stack. This surface absorbs a lot of water during very heavy rains such as were experienced in the Waikato in the early part of last winter. Elsewhere, where falls were not so heavy, the loss from rain-water was small. With young, succulent material very little waste developed on the surface, and with dry material the wastage was slight and less than on the surface of stacks. It was considered that buns would occupy too much ground, thus destroying much pasture, but enclosing fences can be placed right at the edges of the bun and the only pasture lost is that covered by the bun itself. As with the tops of wedges and ramps, the material at the edges showed surprisingly little waste.

Very little work was needed in handling the material, since stacking was not necessary. Buns could be built without any assistance on the stack, the driver occasionally getting off to spread lumps which might cause tipping of the tractor. As with the ramp, the tractor continued on its path after delivering the load until the incline became too steep and the tractor had to be backed up the mound. The tractor should be driven straight up the slope otherwise there is grave danger of tipping sideways.

Thirteen buns were examined and the average bun was 38ft. in diameter, ranging from 20ft. to 60ft., and settled to a height of 4ft. at the centre. Some were 10ft. high when harvesting was completed. The waste on the surface averaged 4½in. or 18 per cent., about the same as with stacks sealed with earth. The waste compares favourably with that on unweighted stacks with 6in. of waste on the top and 10in. on the sides, a total waste of 25 per cent. Although there is much more surface on buns than on stacks, the wastage compares fairly favourably even with weighted stacks, because though the wastage of the tops of these was only 3in., the wastage at the sides averaged 9in.

Sealing

An earth seal, although seldom used except on stacks and trenches, is an advantage, particularly for material that is not to be fed till after the onset of heavy winter rain. With scoops attached to tractors this work on buns, ramps, and wedges would be fairly easy and time would be available in winter to remove the earth.

Feeding out

One farmer purchased a muck loader used in Britain for removing dung from yards where cattle are wintered. When used for feeding out silage this saved much of the heavy work entailed in forking the material on to the trailer. The silage was cut in blocks and the prongs of the loader were driven under each block, which was lifted and placed on the trailer. Another farmer feeding large amounts is reported to use the ordinary grab loader worked by an engine and winch. With normal methods more lifting was involved with low ramps and buns than with wedges, which were usually built higher. The first cut into a wedge sometimes gave disappointing results, because the ends were not well consolidated and much waste occurred on that account.

Important Points

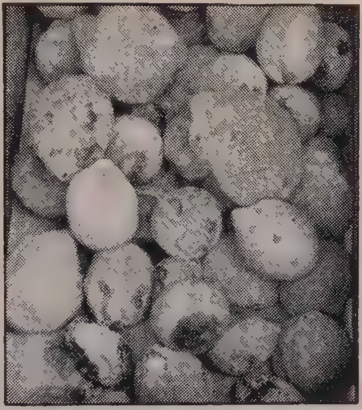
To prevent waste run-through trenches are recommended, since these are superior to all methods of making silage above ground. If above-ground silage is made, buns appear to have some advantage over ramps on flat ground and wedges are justified on hillsides because of ease of approach. There may be less waste on buns made with the buckrake than in orthodox stacks. Ramps can be useful across accessible gullies. By and large it may be said that the use of the buckrake can make poor material into fairly good silage and has resulted in probably less waste than is normal, and with better attention to detail this amount of waste should be reduced. There is little doubt that the buckrake has come to stay in Auckland Province and will largely supersede other methods of silage making, whether buns, wedges, or other queer shapes of stacks are made. It has already resulted in some expansion of silage making and no doubt this will continue now that there is available a cheap implement which is expeditious and has largely made the hand fork unnecessary. This past symbol of the harvest field still has its uses, and better silage with the buckrake would undoubtedly result from more use of it in the right places.

Orchard and Packing Shed Hygiene

ORCHARD sanitation should be given serious thought by every orchardist. Diseases and pests affecting the fruit grower today are too numerous and too difficult to control to be allowed any harbour or breeding place in or near the orchard if such places can be eliminated. A knowledge of orchard diseases, their prevention, and their control is essential, but the practice of hygiene in all operations can help considerably in reducing diseases and pests. A tidy orchard is generally an efficient one, for tidiness is a sign of good management and systematic operation. Some rules of hygiene to be followed in connection with all seasonal activities and also in the disposal of waste fruit and other diseased plant material are discussed in this article by N. J. Hiam, Horticultural Inspector, Department of Agriculture, Auckland.

A tidy orchard is usually a clean one.

DURING winter there should be time and opportunity to consider orchard cleanliness and establish a reasonable programme. Most important is the disposal of prunings and dead limbs and trees. Much of the wood removed from trees during pruning is likely to be diseased. Such diseases as brown rot, silver leaf, valsa injury, wither tip, and various root fungi are known to over-winter in dead wood, so early destruction is essential to prevent the spread of such diseases on to healthy wood during the next season. Similarly, dead trees should be uprooted and destroyed. Fungous growths on the trunks or branches may be the fruiting bodies or spore-producing parts of the fungus which killed the tree and may spread the disease to many more trees if the tree is allowed to remain in the orchard. If the tree has been killed by silver leaf, one of the most dreaded and probably the hardest disease to combat in stone fruit orchards, the danger is very real. Spore-producing fructifications, the only source of infection for silver leaf, develop only on dead wood and can throw off millions of spores to be carried by wind to infect other trees through wood and bark wounds.



[*Sparrow Industrial Pictures Ltd. photo.*
Green mould on lemons. Spores from this source will infect other fruit and contaminate cases.

[*Sparrow Industrial Pictures Ltd. photo.*
This heap of prunings thrown carelessly on the orchard headland may contain fungous disease and is a real source of danger.

Dead trees and prunings should not be dragged through the orchard, but should be loaded carefully on to a vehicle and removed to some place where they can be burnt. Too often these breeding grounds of disease are thrown over the fence or under the shelter belt, but they are just as dangerous there as in the orchard.

A good method of disposing of prunings is by use of a portable furnace. This can be made from an old iron tank mounted either on wheels or skids. The bottom of the tank should be perforated to ensure a draught and to allow the ashes to fall out. If the furnace is mounted so that it can be rocked, this will assist the burning and help to release the ashes. Care should be taken, however, to prevent the fire developing sufficient heat to scorch the trees.

Pruning

Tools used for pruning should be kept in good, sharp condition so that they will cut cleanly without tearing the bark, and should be of a type to allow close cutting. Secateurs which tend to crush the wood or even bruise the bark should be avoided, as such damage may provide entry for infection. Valsa injury in stone fruit trees is one disease which can often be traced to bad pruning cuts.

Saw cuts should be pared smooth, the edges being rounded with a sharp knife, and dressed with a suitable bituminous paint. Whether cuts are large or small, they should be made as close as possible to the part of the tree to be retained. This facilitates healing, whereas if a stub is left it will die back and be an ideal harbour for insect and mite eggs. A dead stub also provides a point of entry for saprophytic fungi.

Where any infectious disease such as European canker or coriolus on pip fruit or bacterial spot on plums is present, frequent sterilisation of pruning tools with formalin is advisable.

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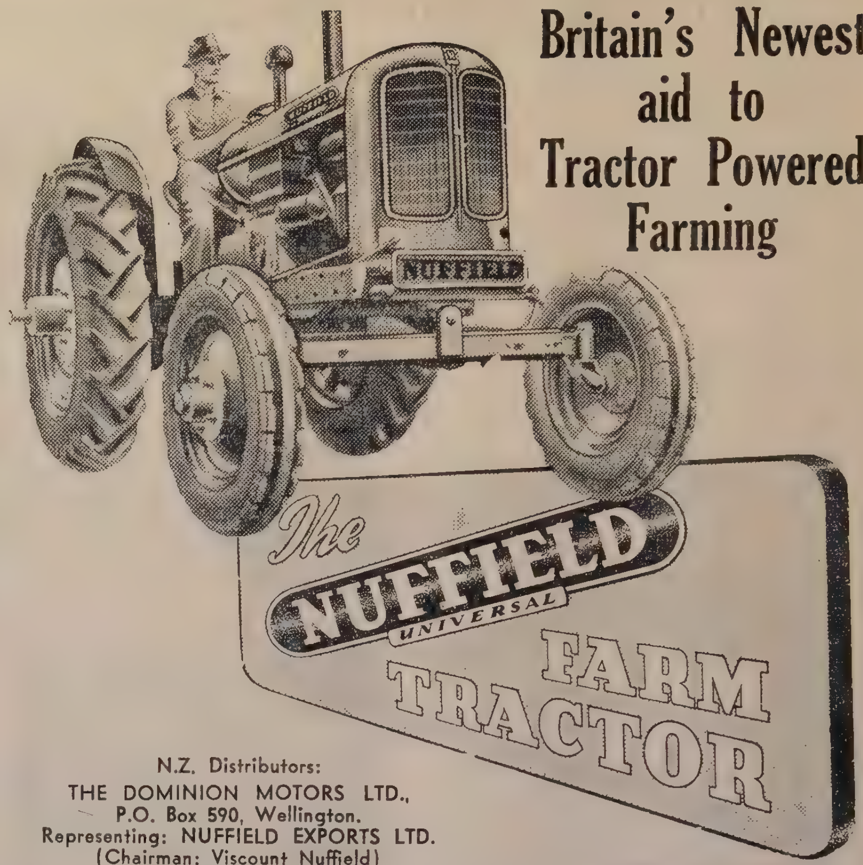
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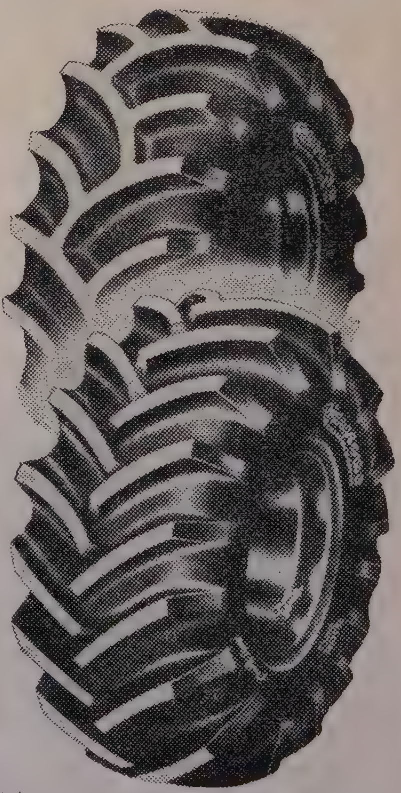

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Decaying fruit in a packing shed is a breeding ground for codling moth and fungous disease.

When stone fruit trees are being pruned a sharp look out should be kept for mummified fruit on the trees as well as on the ground. These and infected wood are ideal over-wintering places for the brown rot fungus and should be collected and burnt. A watch should also be kept for any signs of root rot or bark diseases at the bases of the trees and these infections should be treated immediately by cutting out diseased tissue and applying Bordeaux paste or some other suitable material.

Diseases such as black spot, fabraea scald, leaf rust, and shot hole overwinter in fallen leaves, which, if left on the surface, will re-infect following fruit crops. Early-spring cultivation is the best means of checking disease harboured in this way. Cleaning up should be done up to the trunks of the trees either by digging or other means, and care should be taken that all leaves are buried.

If brown rot blossom infection occurs, causing death of lateral growth, it is advisable to go over the trees carefully after the fruit has set and systematically remove all dead wood. This is arduous, but is essential if brown rot is to be kept to a minimum. Spores breeding from this source can be the means of infecting the ripening crop.

Rough breaks, cracks, damage caused by implements or other means, and broken limbs are ideal points of entry for silver leaf and other diseases and often occur when infection is most active. These injuries should not be left until pruning time, but should be doctored or the affected part should be removed and the wound treated immediately. It is best to remove limbs infected with silver leaf during summer, as the tree will then be more likely to produce a gum barrier, which will help to seal the wound against further infection.

Picking Precautions

The first rule to be observed in picking is to handle fruit carefully. The skin is nature's protection for the flesh of the fruit, and if it is bruised or punctured, the fruit immediately becomes liable to infection from moulds or rots of various kinds. Each handling, from the placing of the fruit in the picking bag or box until it is finally packed, should be carried out with care. Special attention should be given to the handling of stone fruit because of the prevalence of brown rot. Diseased fruit on the trees or ground should not be handled in the same operation as sound fruit. Separate containers should be used and diseased fruit destroyed by burning or burying deeply. Picking cases should be disinfected frequently either by dipping or spraying with a fungicidal solution.

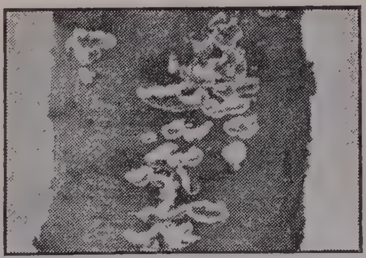
Packing Shed Cleanliness

Trees near packing sheds are often more seriously affected by disease and insect pests than those further away because of neglect of elementary hygiene around the sheds. Such insects as codling moth find ideal haunts to spin their cocoons in fruit cases and corrugated strawboards, under sacking or canvas grader bins, and in other places in the packing shed. It is possible also that such fungous diseases as brown rot or blue or green mould may be harboured in decayed or mummified fruit allowed to remain in cases or under benches.

A clean and tidy shed is the answer to this problem, and where methodical operation is the general rule a weekly clean-up will not be a big job. Fresh water, soap, and disinfectants should always be available in the packing shed, and workers should be trained to wash their hands frequently, especially when handling fruit infected with brown rot.

Disposal of Waste Fruit

Perhaps the most perplexing problem is how to dispose of waste fruit once it is gathered. Arrangements should be made before harvesting begins to destroy all diseased fruit which cannot be sold to factories so that there will be no build-up of this waste fruit within the orchard, where it is a potential menace to present or future crops. All reject fruit is not diseased and all diseased fruit is not necessarily infectious. If non-infectious fruit is kept separate, it is often possible to dispose of it to institutions or to farmers for stock food, and this will reduce the amount to be destroyed.



The fungus that is responsible for silver leaf (*Stereum purpureum*). It will live for years on dead wood to infect other trees.

Burning is the most effective method of destruction, but it may seldom be possible to have sufficient fuel to destroy all waste fruit.

Burying is probably the most practicable method and a suitable hole or holes large enough to contain the season's waste can be excavated during some opportune time before harvest.

Fruit should be dumped in the holes and covered with soil to prevent the release of spores or insects. The application of disinfectant would be an added precaution.

Danger of Epidemics

It may be contended that with modern spray materials and methods strict orchard hygiene is out of date and unnecessary, but the errors of this belief will be apparent after a moment's thought. There is always the danger of a disease appearing in epidemic form. Weather favourable to fungous diseases is usually unfavourable for spraying operations, so that a little care taken in preventive hygiene may be of more value than many gallons of spray applied under epidemic conditions.

Fungous diseases may lie more or less dormant in heaps of prunings for years, but under favourable conditions they may create an epidemic beyond the power of the orchardist and his neighbours to control.

The orchardist has only to increase his percentage of marketable fruit a little to offset the slight expense required for labour and material in keeping his orchard and packing shed clean. Carelessness may not only reduce the crop, but may also result in loss of valuable trees which will take years to replace.

The added pleasure from managing and working in clean and tidy surroundings in contrast with muddling along under unmethodical and untidy conditions should well repay any extra work needed to carry out the recommended hygiene practices, apart from the added advantages in increased quantities of saleable fruit.

Care of Livestock during February

Contributed by the Animal Research Division

PREPARATIONS FOR TUPPING

If the ewes have been held on short pasture since weaning, they should now be in good hard condition. About 21 days before tupping they should be crutched and given the best pasture available. Experiments at the Department of Agriculture Animal Research Station, Ruakura, have shown that flushing ewes for 3 weeks before tupping and keeping them on good pasture for 3 weeks after tupping commences increases the number of lambs weaned by 15 to 20 per cent. An account of the experiment was published in the November 1951 issue of the "Journal". Rams, too, should be crutched and flushed for about 3 weeks before tupping. They should be dipped before this flushing period, as dipping too close to tupping appears to reduce ram fertility.

COBALT DEFICIENCY

Bush sickness can be prevented completely by topdressing annually with cobaltised superphosphate, and in the North Island at least this is best applied in the usual autumn topdressing. Cobaltised superphosphate prepared in North Island works contains 3lb. of cobalt sulphate per ton; 2cwt. of this fertiliser contains sufficient cobalt for 1 acre. In the South Island cobaltised superphosphate contains 6lb. of cobalt sulphate per ton, and 1cwt. of this fertiliser per acre contains sufficient cobalt. If greater quantities of fertiliser than those indicated are used, the additional amount need not be cobaltised. For fuller details consult the Department of Agriculture's Bulletin No. 180.

SOWS AND WEANERS

Sows with litters should be fed at the rate of 4 gallons of milk plus 2/3 gallon per pig suckled. Sows and litters should be allowed at least 2 hours' grazing per day. It is an advantage to provide water sprays for both suckling and dry sows during summer, as since pigs possess very few sweat glands, they can be kept cool only by the evaporation of water from the skin. Litters over 3 weeks of age must have milk and meal available at all times. Observations at Ruakura have shown that piglets suckle at intervals of 75 to 90 minutes throughout the 24 hours, and after the sixth week they visit the creep after each suckling. Good creep management can add 6 to 10lb. per pig to the weaning weight. Weaned sows must be well fed to ensure successful mating. A ration of 4 to 6 gallons of milk daily plus grass is essential. Weaned pigs should be fed 1½ to 2 gallons of milk daily. If the milk available is not sufficient to provide this, the feeding of meal to supplement the milk ration, replacing 1 gallon of milk with 1lb. of meal, is highly profitable at the present meal and meat prices.

FACIAL ECZEMA

If warm rains fall in February after a spell of hot, dry weather, facial eczema is likely to occur in districts which are usually affected. Experience during recent years has shown conclusively that the disease can be prevented by shutting sheep up at the rate of at least 100 to the acre as soon as the rains fall, and keeping them so confined until the weather becomes either hot and dry or much cooler and the pasture visibly hardens. If dry periods occur, plans should be made for action along these lines: Good hay at the rate of 2lb. per sheep per day will prevent loss of condition. If crops of rape, kale, turnips, or chou moellier are available, they can be grazed safely during the dangerous period. The grazing of such crops is the only satisfactory way of preventing the disease in lambs, which react badly to restricted grazing. Lucerne has not proved safe, possibly because ryegrass is frequently present in it as a weed.

CARE OF CALVES

Autumn is a critical period for calves. Deaths during winter can be eliminated by rotating the calves through the paddocks ahead of the cows at intervals of 3 or 4 days. If this is not being done, it should be begun immediately. Calves treated in such a way will be up to 100lb. heavier as yearlings than those kept confined in a calf paddock. If calves are unthrifty and scouring, it may be necessary to give 2 or 3 doses of phenothiazine at 3-weekly intervals, but this is seldom necessary with calves which are rotationally grazed.

COPPER DEFICIENCY

Scouring in cattle and staggering in lambs grazing on peat land can be prevented by topdressing the pastures in autumn with 5lb. of bluestone per acre. Copperised superphosphate is now available or the bluestone may be mixed with lime. For fuller particulars the Department of Agriculture's Bulletin No. 238 should be consulted.

VITAMIN A FOR POULTRY

Vitamin A is essential to poultry for protection against various infections, particularly colds and contagious catarrh. Poor egg production is a common feature of an inadequate supply of vitamin A to laying birds. Greenfeed is a useful source, but at certain periods of the year when this becomes scarce or poor in quality it may be of little value. Growing birds on open range may suffer from vitamin A deficiency during very prolonged dry spells of weather. Although there is apparently plenty of greenfeed available, it may be of very poor quality. The addition of a vitamin A supplement such as fish liver oil during times of greenfeed shortage is advisable for both growing and laying birds. The amounts used vary according to the age of the birds and the potency of the oil used. The quantity advised by the manufacturer of the oil should be added to the diet. Further advice on the use of vitamin A supplements may be obtained from the local Poultry Instructor of the Department of Agriculture, and a special leaflet on the subject is available.

Dairy Produce Graded for Export

The following figures showing quantities of dairy produce graded for export during November and for the 4 months ended 30 November 1952, with comparative figures for the same month and 4-monthly period of 1951, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

		Tons		Percentage
Period	Creamery	Whey	Total	inc. or dec.
November 1952	22,364	402	22,766	—
November 1951	23,531	401	23,932	—
Increase or decrease ..	—1,167	+1	—1,166	—4.872
4 months ended 30/11/52	71,186	1,208	72,394	—
4 months ended 30/11/51	67,993	1,114	69,107	—
Increase or decrease ..	3,193	+94	+3,287	+4.756

Butter in store at 30 November 1952 was 13,808 tons

CHEESE

		Tons		Percentage
Period	White	Coloured	Total	inc. or dec
November 1952	14,101	37	14,138	—
November 1951	13,859	46	13,905	—
Increase or decrease ..	+242	—9	+233	+1.675
4 months ended 30/11/52	36,171	56	36,227	—
4 months ended 30/11/51	33,430	56	33,486	—
Increase or decrease ..	+2,741	—	+2,741	+8.185

Cheese in store at 30 November 1952 was 8,408 tons

If these figures are converted into butterfat equivalent, there is an increase of 5.371 per cent. in butterfat graded for the 4 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Autumn-sown Grass; Topdressing Hill Country

Seasonal Notes by the Extension Division

IMPORTANT items of seasonal work are seed-bed preparation for autumn-sown pastures, sowing of cereals for autumn and winter greenfeed, and, if the weather is favourable, autumn pasture topdressing.

SEED-BED PREPARATION FOR AUTUMN-SOWN GRASS

The relatively small seeds of grasses and clovers comprising a pasture seeds mixture require a fine, firm, level moist, and warm seed-bed to ensure even seed distribution at correct sowing depth, and the quick, even establishment of a dense and vigorous sward. Where the ground surface is rough and uneven and the tilth poor and lacking in consolidation, seed becomes unevenly distributed, is covered at varying depths in the soil, and does not contact soil moisture intimately.

On light-textured soils of a sandy or peaty nature under-consolidation frequently causes unsatisfactory pasture establishment, and early preparation and summer fallowing, allowing time to effect natural consolidation, provide the surest means of overcoming this difficulty. Late ploughing and hasty preparations immediately before sowing are doomed to failure, for all too frequently the resultant poor, weedy "strike" and thin, low-productive sward can seldom be improved even by liberal topdressing and the most careful management.

On stiff clay and heavy silt soils over-consolidation, often due to excessive rolling, may prove as serious a limiting factor as under-consolidation on light soil types. Heavy, excessively consolidated soils tend to cake and subsequently dry out and crack, resulting in the death of most seedlings that have managed to penetrate the hard surface. Similarly, the exceedingly fine tilth obtained by too much top working of fine-textured, heavy soils causes the formation after rain of an encrusted surface pan that hampers germination and seedling establishment. Inadequate drainage, even if it does not affect the strike, will almost certainly affect the establishing sward during its first winter.

PRIOR CROP

Autumn-sown grass normally follows (a) a spring-sown forage crop, (b) autumn-harvested cereals, or (c) summer-fallowed land out of winter crop or old pasture. As February-early March sowing is generally desirable, the spring-sown, autumn-grazed forage crops require early feeding off to allow adequate preparation of the grass seed-bed. Rape, early soft turnips, and greenfeed cereal, especially millet, lend themselves to this practice, and field peas, as a green fodder, are a good preparatory crop, provided they can be matured and fed off early enough. On mixed arable farms pastures are often sown after early-harvested autumn-sown cereals, but it is becoming more common to sow after a summer fallow following a fed-off green cereal crop, and this is certainly the best method.

When renewing run-out pastures on all-grass farms, grass to grass establishment proves satisfactory only where cultivations begin early (November-early December) to allow a short summer fallow. The summer fallow is the surest method to obtain a fine, firm, moist, and weed-free seed-bed, especially on heavy, weedy ground or in low-rainfall areas. It has some disadvantages where soils are light and winds persistently strong and where high summer rainfall or pressure of other seasonal work prevents regular weed-control cultivations on the fallow.

CULTIVATION

After cereals the ground is prepared for ploughing either by burning off straw and stubble or by baling the straw and ploughing in short stubble. Ploughing is followed by top working with discs, and/or hustler, to an increasingly shallow depth, followed by harrowing and rolling.

Heavier soils will require more cultivations than friable loams and lighter types, but the latter may require less discing but several rollings to achieve satisfactory consolidation. On heavy soils, after fodder crops, plough immediately the crop has been fed off and work down with discs and harrows. The use of clod-crusher and roller may or may not be necessary, depending on the friability of the soil and the risk of over-consolidation and caking. On light soils, after rape and turnips, ploughing may be omitted, as discing and harrowing will often achieve the necessary tilth and are less likely to affect consolidation.

Winter-cropped land, especially of a heavy or weedy nature, and most soil types in low-rainfall districts should be prepared by summer fallowing begun by deep ploughing in spring, followed by periodical hustling for weed control and moisture conservation. When proceeding from grass to grass, plough in November-December after close grazing or an early silage cut; roll on the furrow; summer fallow with occasional discings, and complete cultivations with harrows and roller. Where the old pasture forms a matted turf it is advisable to disc or grub the area before deep ploughing or to use skim coulter attachments when ploughing.

—*A. R. DINGWALL*

* * *

HILL-COUNTRY TOPDRESSING

THE main plant nutrient deficiency limiting production in the hill country of New Zealand is phosphate, although there are extensive areas where lime applications would be required to obtain the greatest response from phosphatic fertilisers. Responses shortly after application are usually not required on sheep country and a slower-acting, longer-lasting form of fertiliser may be advantageous. Most phosphatic fertilisers available at present are quite satisfactory for hill-country topdressing and the inclusion of slower-acting rock phosphates in fertiliser mixtures may have a value in sheep country that is not so apparent in dairying country.

The rate of application depends primarily on the potential productivity of the land. Heavy dressings of fertilisers cannot be considered economic on land of low productivity unless there is some factor, such as soil conservation, to consider as well as pasture production. Because application costs are heavy in hill country, it may be better to apply, say, 3cwt. per acre every second year than 1½cwt. per acre annually.

The time of application is much less important on hill country than on dairying country, and although autumn topdressings are the most desirable, farmers should not hesitate to apply fertiliser at other seasons if the fertiliser is available and the means of distributing it are to hand.

METHODS OF APPLICATION

The aeroplane has revolutionised hill-country topdressing. Before 1950 little fertiliser was dropped from the air; in 1950 (year ended 31 March) about 5000 tons; in 1951, 45,000 tons, and in 1952 about 90,000 tons were dropped. Aerial application has in 3 years become the main means of applying fertiliser to hill country and at the same time has been the means of extending the area topdressed.

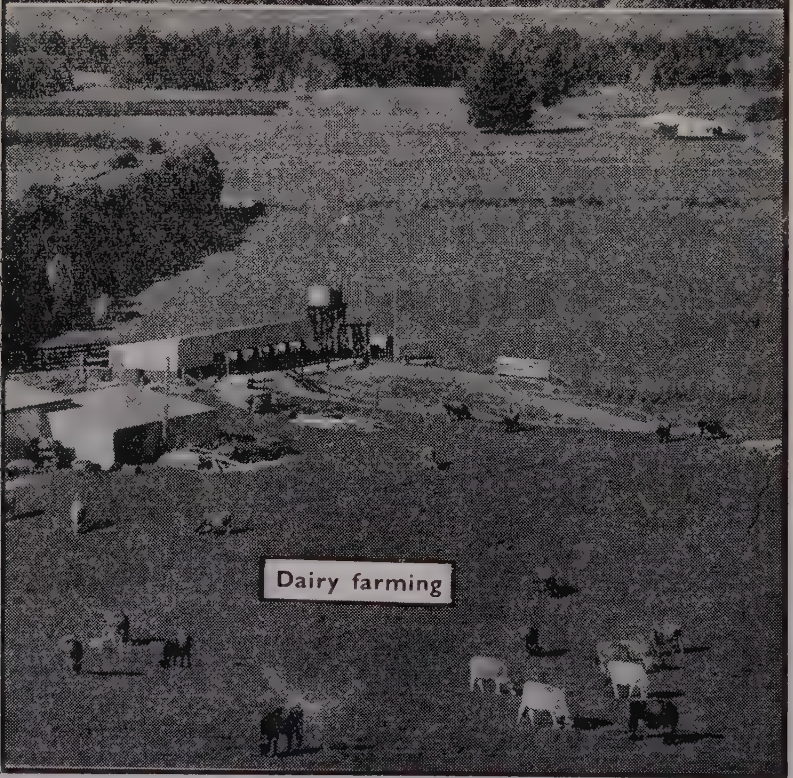
Aerial topdressing is not cheap and in certain conditions the use of blowers can be considered. Blower topdressers, however, do not give an efficient distribution of fertiliser, but application costs are low. Finely divided materials such as basic slag and North African rock phosphate, which may have a place on lime-deficient hill country, are spread reasonably well by the blower, whereas their fine, dusty nature makes them unsuitable for aerial application.

—*P. B. LYNCH*

Classification of Farm Holdings Emphasises

By W. N. PATON, Senior Investigational Officer, Department of Agriculture, Wellington

Beef cattle on hill country



Dairy farming

LAND use in New Zealand is considered under three major headings, livestock farming, other types of farming, and residential and unused holdings, in this, the final article of a series dealing with a special classification of agricultural and pastoral holdings based on statistical data collected for the 1950 World Census of Agriculture.

DAIRY, sheep, and beef farming groups have been combined to form what conveniently may be termed the "livestock farming" group. Grazing holdings of all types have been included as well, because almost all these holdings are devoted to the grazing of cattle and sheep. The following counties had more than 90 per cent. of their holdings devoted to cattle and sheep farming in the 1949-50 season. (The letter D or S accompanying each percentage indicates whether dairy or sheep farming was more widely practised in that county):—

	Per cent.
Eketahuna	99.2 (D)
Hauraki Plains	97.5 (D)
Clifton	96.4 (D)
Inglewood	96.4 (D)
Piako	96.1 (D)
Waimate West	96.0 (D)
Stratford	95.9 (D)
Whangamomona	95.8 (S)
Eltham	95.5 (D)
Egmont	95.3 (D)
Otorohanga	95.2 (D)
Woodville	95.2 (D)
Matamata	95.1 (D)
Akitio	94.8 (S)
Pohangina	94.4 (S)
Mauriceville	94.4 (D)
Whakatane	94.0 (D)
Hobson	93.9 (D)
Pahiatua	93.8 (D)
Patea	93.3 (D)
Kiwitea	93.3 (S)
Waikato	92.9 (D)
Kaikoura	92.4 (D)
Raglan	92.1 (D)
Waipa	91.9 (D)
Waitomo	91.5 (S)
Patangata	91.0 (S)
Dannevirke	91.0 (D)
Castlepoint	91.0 (S)
Ohinemuri	90.7 (D)
Wairarapa South	90.1 (D)

In this list of 31 counties only one South Island county, Kaikoura, gains a place, and sheep farming leads dairying in only seven instances. In previous articles dealing with dairy and sheep farming it was pointed out that some counties did not rank high on either the dairy or sheep farming list because specialised dairy and sheep farming were each fairly widely practised in those counties or because considerable attention was paid to other forms of livestock farming. However, a number of such counties have been brought to the fore when listed under livestock farming, a combination of cattle and sheep farming. They included the following in the above list: Eketahuna, Whangamomona, Woodville, Pohangina, Mauriceville, Hobson, Pahiatua, Patea, Kiwitea, Kaikoura, Raglan, Waitomo, Dannevirke, and Wairarapa South.

The percentages of dairy farming (D) and sheep farming (S) in several counties were fairly even: Mauriceville (D, 47.7; S, 46.7), Patea (D, 48.1; S, 41.8), Kaikoura (D, 43.2; S, 38.3), Waitomo (D, 40.8; S, 45.6), and Dannevirke (D, 45.8; S, 42.1). The lift in the combined percentages has been assisted appreciably for two of the counties mentioned by the inclusion of the grazing group of holdings; 18.4 per cent. in Hobson and 10 per cent. in Kaikoura.

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Predominant Place of Livestock Farming

The list of 31 counties having 90 per cent. or more of their holdings devoted to livestock farming shows that Taranaki Province is the leading district, with 7 counties in the first 10. South Auckland has 10 counties in the list and Wellington Province 9.

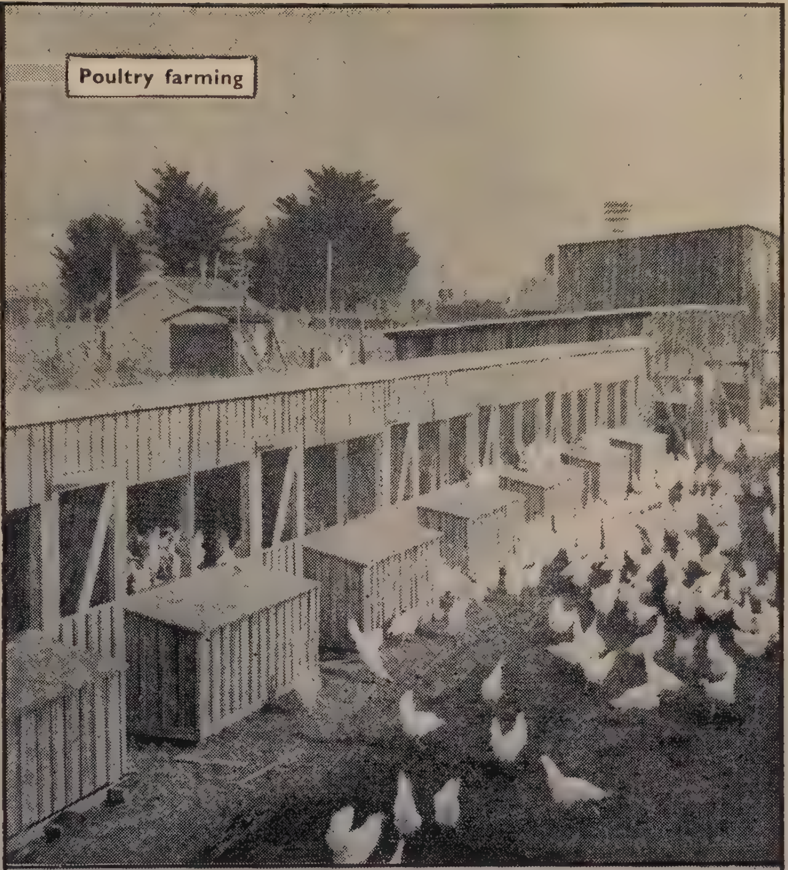
The next list is of the counties where between 80 and 90 per cent. of holdings were devoted to livestock farming; 10 South Island counties are represented, compared with 24 in the North Island. Sheep farming was numerically more important than dairy farming in 15 of the 34 counties. The second list is as follows:—

	Per cent.		Per cent.
Oroua	89.9 (D)	Whangarei	86.3 (D)
Franklin	89.8 (D)	Weber	85.9 (S)
Manawatu	89.5 (D)	Ohura	85.0 (S)
Kairanga	89.4 (D)	Whangaroa	84.6 (D)
Otamatea	89.3 (D)	Mangonui	83.9 (D)
Akaroa	89.2 (D)	Southland	83.9 (S)
Opotiki	88.4 (D)	Rangitikei	83.8 (S)
Hokianga	88.2 (D)	Maniatoto	83.6 (S)
Featherston	88.2 (D)	Matakaoa	83.5 (S)
Takaka	88.1 (D)	Mackenzie	83.4 (S)
Waipawa	87.8 (S)	Uawa	82.6 (S)
Wairewa	87.8 (S)	Thames	82.2 (D)
Kawhia	87.6 (S)	Clutha	82.0 (S)
Rodney	87.3 (D)	Coromandel	81.8 (D)
Hawera	86.9 (D)	Waihemo	81.2 (S)
Taranaki	86.5 (D)	Taumarunui	81.1 (S)
Wanganui	86.3 (S)	Murchison	80.9 (D)

The counties in this list are more widely distributed throughout New Zealand than those in the preceding list. The bulk of the more intensive dairying counties are accounted for by the two lists. Except for having an appreciable proportion of holdings in the "residential" and "unused" groups, other counties would rank high for percentage of holdings devoted to livestock farming and also rank low for holdings devoted to "other" farming. In this category may be listed the following counties (the first figure in each parentheses is the percentage of livestock farming and the second the percentage of "other" farming: Waipukurau (79.8, 4.7), Rotorua (78.7, 7.1), Collingwood (78.1, 2.2), Kaitieke (77.4, 7.0), Wairoa (76.0, 5.0), Waiapu (75.7, 5.2), and Chatham Islands (70.5, 1.1). There are 22 counties having between 70 and 80 per cent. of their holdings devoted to livestock farming, 17 having between 60 and 70 per cent., and 11 having between 50 and 60 per cent. The remaining 13 counties have fewer than 50 per cent. of their holdings devoted to livestock farming.

Other-than-livestock Farming

The percentages of holdings devoted to "other-than-livestock" farming, excluding residential and unused holdings, are highest for the following counties (percentages in parentheses): Waimairi* (56.4), Heathcote* (52.3), Paparua* (52.2), Waimea* (48.9), Ellesmere* (47.9), Malvern* (46.8), Eyre* (45.9), Ashburton* (41.9), Eden* (40.0), Ashley (38.1), Waimate (36.3), Vincent (35.9), Hawkes Bay (35.7), Levels (35.1), Marlborough (34.9), Rangiora* (34.1), Cook (30.9), Selwyn (29.4), Halswell* (28.7), Oxford (28.1), Kowai (28.0), Waitemata* (27.9), Waitaki (26.9), Springs (25.9), Taieri (25.1), Mt. Herbert (24.7), Manukau (22.5),



Poultry farming

Cash cropping (wheat)

Fat-lamb farming

Horticulture (raspberries)

Geraldine (21.3), Tuapeka (21.2), and Cheviot (21.1).

The counties marked with asterisks, together with Stewart Island, are the 13 counties in which less than 50 per cent. of the holdings are devoted to livestock farming. Cash cropping and/or horticultural activities are mainly responsible for counties being ranked high in the above list, although of course other activities such as poultry farming, mixed farming, pig farming, and horse raising contribute to the totals. Horse raising was assigned to the "other" rather than to the livestock grouping, because so much of it is concerned with racehorses.

Residential and Unused Holdings

When percentages for residential and unused holdings within counties are combined the counties highest on the list (20 per cent. and more) are Stewart Island (66.7), Eden (38.8), Makara (30.1), Chatham Islands (28.4), Heathcote (27.8), Buller (26.8), Inangahua (25.8), Grey (25.4), Peninsula (24.8), Halswell (24.6), Tawera (23.3), Waimairi (23.2), Waitemata (23.0), Taupo (22.4), and Westland (22.0).

The presence of these two groups of holdings may affect the position materially when counties are compared for types of farming, and accordingly due allowance should be made where counties that have substantially divergent percentages of residential and unused holdings are being compared.

Details for these two groups (treated individually) were given in the preceding article of this series, and the main value of the above list is to indicate in what counties the combined percentages of residential and unused holdings are substantial.

Dominance of Livestock Farming

The review of the types of farming practised in New Zealand given in this article and others in this series shows clearly that livestock farming predominates in almost all districts. Dairy farming is in the ascendancy in more districts than is sheep farming, and between them these two groups account for roughly 3 out of every 4 holdings; 1 in every 10 holdings is used either for residential purposes only or is unused in the agricultural sense, and 1 in every 7 holdings is devoted to other-than-livestock farming (cropping, horticulture, poultry farming, mixed farming, etc.). If residential and unused holdings are omitted, 84 per cent. of the remaining holdings come under the livestock farming heading.

The following table summarises the position for the major divisions of the country and according to the main farming-type groups:—

Farming-type Group	NORTH ISLAND Per cent.	SOUTH ISLAND Per cent.	NEW ZEALAND Per cent.
Dairy farming	57.1	20.3	44.0
Sheep farming	20.7	34.9	25.8
Beef cattle raising	1.4	1.4	1.4
Grazing areas	3.8	5.5	4.4
Livestock farming	83.0	62.1	75.6
Horticulture	4.2	6.9	5.1
Cash crops (annual field crops)	0.5	7.8	3.1
Poultry farming	1.3	2.1	1.6
Mixed farming	0.7	4.1	1.9
Other farming activities	2.1	3.6	2.7
Other-than-livestock farming	8.8	24.5	14.4
Residential holdings	5.9	10.3	7.4
Unused holdings	2.3	3.1	2.6
Residential and unused holdings	8.2	13.4	10.0
Totals	100.0	100.0	100.0

Weedkillers for the Home Garden

WITH the recent development of hormone weedkillers and grass-killing preparations for agricultural purposes home gardeners have available effective materials for the control of weeds in lawns and troublesome garden weeds that are difficult to eradicate by normal cultural practices. The introduction of these materials into garden areas is, however, dangerous to susceptible vegetables and ornamental plants unless the materials are used with care. This article by L. J. Matthews, Weeds Research Officer, Department of Agriculture, Wellington, explains simply how the new weedkilling preparations are used to the best advantage and ways of avoiding damage to associated plants of value.

THE weedkillers suitable for the home garden are divided into two groups, the hormone weedkillers and the grass-weed killers.

HORMONE WEEDKILLERS

Most weeds fall into the category of broad-leafed flowering plants and with few exceptions are destroyed with hormone weedkillers. The advantages of hormone weedkillers over other types of chemicals used for weed control are that they are non-poisonous to animals, non-corrosive, and relatively easy and pleasant to use.

Properties

The properties of hormone weedkillers are summarised in Table 1. The hormone preparations are derived from three parent acids known as M.C.P., 2,4-D, and 2,4,5-T (2,4,5-T is used for scrub killing and is not considered in this article in detail). From each of the parent acids sodium salts, amine salts, and esters are formulated. As shown in Table 1 various proprietary brands of these materials are available. Proprietary brands differ in the amount of active weedkilling principle contained in a gallon of weedkiller or pound of dust. The active principle in hormone weedkillers is related back to the parent acids M.C.P., 2,4-D, and 2,4,5-T, and is called the "acid equivalent" content. The acid equivalent is expressed in pounds of parent acid per gallon or as a percentage weight for dusts. For example, in the amine salt section the amount of acid equivalent varies from 1.25lb. per gallon to 4.8lb. per gallon, depending on the proprietary product. Owing to this variation and the number of proprietary products available all recommendations are made in pounds acid equivalent per acre. For example, catsear is eradicated by 0.5lb. of acid equivalent to the acre of the amine salt of 2,4-D. One gallon of a preparation listed as containing 2lb. of acid equivalent per gallon would control 4 acres of catsear.

The hormone preparations in Table 1 are non-volatile, as volatile preparations are not recommended for the home gardener. Volatile materials are those that pass off vapour when exposed to the atmosphere, particularly under high temperatures. Benzene is a common volatile material. The vapours from volatile hormone preparations are toxic, particularly to susceptible plants such as tomatoes and brassicas. Volatile hormone preparations are particularly dangerous under hot, humid conditions and when wind is negligible.

The sodium and amine salt preparations are soluble in water and are termed water based. Most esters are soluble only in various organic solvents such as oils and are termed oil based. With added emulsifiers and wetting agents the esters can be readily mixed with water. Dust preparations are available either as 1 per cent. dusts or as concentrated dusts. Dusts may be spread dry or may be dissolved in water in the case of water-soluble salt preparations. The toxicity of water-based preparations is reduced by rain shortly after application, but oil-based preparations are not affected by such rain.

Salts, Amines, and Esters

In general the sodium salt of M.C.P. is the most selective preparation, but it controls fewer weeds than the 2,4-D preparations.

The sodium salt of 2,4-D is slightly more toxic and hence less selective than the sodium salt of M.C.P. The amine salts of 2,4-D are more toxic per unit dose than the sodium salt of 2,4-D. All these preparations are water based and are particularly suitable for the destruction of most lawn weeds. Weeds with a waxy covering on the leaves such as waxweed are little affected by the water-based preparations, and the more potent group of ester preparations is required for their destruction. The ester preparations are absorbed by the plants more readily than the water-based preparations.

Mode of Action

Unlike weedkilling chemicals such as sulphuric acid, sodium chlorate, and arsenicals, the hormone weedkillers destroy more than that part of the plant which is touched by the chemical. Once absorbed the hormone preparations move freely through the plant in the direction of food movement. If the application is made when the plant is growing vigorously and excess food is being manufactured, the hormone preparations move into the vertical growing roots of the weed. This means that such taprooted weeds as dandelions are usually killed with a single application of hormone weedkiller.

Broad-leafed Weeds in Lawns

Discussion of the use of hormone weedkillers will be confined to weed control in lawns, as control of weeds such as gorse and blackberry on vacant sections has been dealt with fully in the April and May 1952 issues of the "Journal of Agriculture".

Lawns to be treated with hormone preparations should not be mown for a week before application and for the same period after. The more leaf area the weed possesses at the time of application the more susceptible it is. Hormone preparations are slow acting and if the weeds are mown shortly after application, a top kill of the leaves only results, as sufficient time has not elapsed for the hormone to be transported into the root system. This applies particularly to deep-rooted perennials.

For weed control with chemicals lawns may be divided into grass lawns (browntop, chewings fescue), grass and clover lawns, and lawns

Section of a lawn badly infested with plantain, catsear, and white clover. All these weeds can be eradicated with hormone preparations.

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VITAMIN A
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with mixed species such as grasses, clovers, yarrow, and Mercury Bay weed.

Grass Lawns

Hormone weedkillers are excellent for controlling weeds in grass lawns. Once the grasses have tillered in the newly sown lawn they are resistant to applications of hormone weedkillers. Invading clover species may be destroyed with ester preparations of 2,4,5-T at 2 to 3lb. of acid equivalent per acre (1 to 2 fl. oz. per 20 sq. yds.). Established plants of perennial clovers require repeat applications to be destroyed completely. Ester preparations of 2,4-D at the same rate will serve the same purpose.

Grass and Clover Lawns

In newly sown grass and clover lawns once the clover is past the true 2 to 3 leaf stage, all weeds, with the exception of a few species such as waxweed, may be controlled with water-based hormone preparations without damage to either the grass or the clover. In old lawns of this nature waxweed may be removed without killing the clover.

Mixed Species

Hormone weedkillers are not recommended as a blanket application, as both yarrow and Mercury Bay weed are susceptible and may be destroyed with repeat applications. Spot treatments of susceptible weeds such as flatweeds are possible without damage to associated lawn species.

Danger to other Plants

All crops, with the exception of maize, potatoes, peas, strawberries, brambles, and currants are susceptible to hormone weedkillers. The crops named are susceptible to damage at the flower-head formation. Primary leaves of brambles and currants are prone to damage. All other crops must be regarded as extremely susceptible and can be severely damaged by spray drift, drifting dusts, or volatile fumes. These crops include tomatoes, swedes, turnips, cabbages, broccoli, cauliflowers, silver beet, kohl rabi, brussels sprouts, pumpkins, marrows, melons, cucumbers, beans, onions, carrots, parsnips, red beet, and kumaras. Flowers, particularly annuals, grapes, fruit trees, and ornamental plants must also be regarded as susceptible. Fruit trees and grapes are particularly susceptible when new leaves are forming.

This lawn is free of weeds because it was treated with sulphate of ammonia and hormone weedkillers.

Safety Precautions

With Spray Drift

Applying of sprays or dusts in windy weather should be avoided, particularly if the direction of the wind is toward susceptible plants. Spraying and dusting should not be carried out unless wind velocity is less than 5 miles per hour. The most suitable time is early morning, when convection currents are downward.

With the use of coarse nozzles, a high volume of water, and low pressures spray drift can be avoided. Spray equipment that atomises or fogs the spray particles should not be used. Coarse Bordeaux nozzles or special high-volume fan nozzles are particularly suitable. Where spray drift is not a hazard quantities of water as low as 1 to 2 gallons per acre can be used successfully. In urban areas 30 to 40 gallons of water per acre should be used. Pressure should not exceed 20 to 30lb. per square inch.

With Dusts

In all cases dusts are more dangerous than sprays. Dusts are usually finely ground and easily wind borne. To be effective they should be applied to moist foliage. They are most suited for spot treatments of lawns by hand. The application should be made in early morning, when the weeds are still wet with dew. Dust applicators should not be used. Dusts mixed with fertilisers should be stored in airtight containers away from other bags of fertiliser or seed.

Properties of Preparations

As shown in Table 2 most lawn weeds are destroyed with water-based applications. These materials are also

TABLE 1—NON-VOLATILE HORMONE PREPARATIONS FOR THE HOME GARDENER*

Type	Formulation	Trade name	Pounds acid equivalent per gallon of liquid or pound of dust	Base of weedkiller	Amount to apply per 100 sq. yds. to give 1lb. of acid equivalent per acre
M.C.P.	Sodium salt	"Agroxone"	1.0	Water	4 fl. oz.
		"Agroxone 3"	3.0	Water	1⅛ fl. oz.
		"Phenoxylene 30"	3.0	Water	1⅛ fl. oz.
		"Tuloxone 10"	1.0	Water	4 fl. oz.
		"Tuloxone 30"	3.0	Water	1⅛ fl. oz.
		"Agroxone Powder"	0.01	Water	2lb.
2.4-D	Sodium salt	"Phenoxone"	0.82	Water-soluble powder	3oz.
		"Frenokone"	0.75	Water-soluble powder	3oz.
		"SHWK"	0.75	Water-soluble powder	3oz.
		"Economone"	0.75	Water-soluble powder	3oz.
		"Stantox 90"	0.75	Water-soluble powder	3oz.
	Amine salt	"Stantox 20"	2.0	Water	2 fl. oz.
		"Stantox 64"	4.0	Water	1 fl. oz.
		"Weedar 77"	4.8	Water	1 fl. oz.
		"Dee Cee Pee"	1.25	Water	3 fl. oz.
		"Ataweed Concentrate"	4.0	Water	1 fl. oz.
	Butoxy ethanol ester	"Weedone 57 N.V."	3.6	Oil	1 fl. oz.
	Polyethylene glycol ester	"A.C.P.-W30"	4.5	Water	1 fl. oz.

* Volatile preparations are not included, as they are not recommended for the home gardener.

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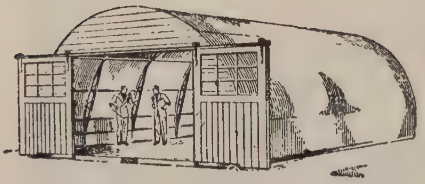

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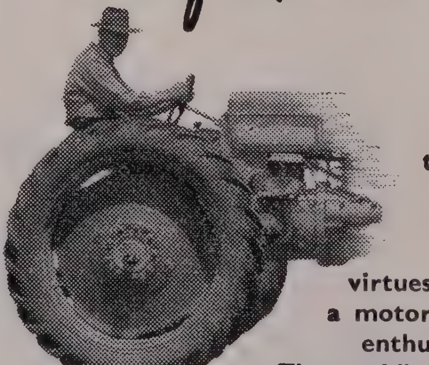

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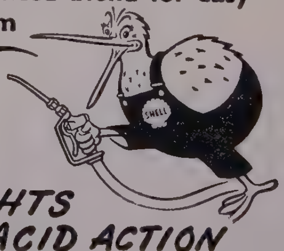

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more selective or less damaging to susceptible species other than weeds such as fruit trees. Ordinary garden sprayers may be used to apply water-based salts and amine salts, as all traces of these preparations may be removed from the sprayer with hot soapy water. Oil-based preparations on the other hand contaminate spraying equipment and all traces of the hormone preparation are difficult to remove. All leather washers, hosing, and diaphragms have to be replaced if the sprayer is to be used later for garden crops. Use of oil-based esters should be limited to weeds such as waxweed that are difficult to kill.

Volatile oil-based preparations should not be used in gardens. The toxic vapour that passes off from such preparations is sufficient to destroy susceptible plants such as tomatoes. Nevertheless it must be realised that spray drift is a greater hazard than volatility and spray drift is just as likely to occur with non-volatile water-based preparations.

New types of water-based esters of 2,4-D are becoming available and trials may establish that weeds such as waxweed that are difficult to kill may be controlled by such preparations without contaminating spray equipment. Such preparations have no volatility hazard.

Keeping Properties

Hormone materials may be stored from year to year without deterioration. Dust preparations should be kept in airtight containers to minimise contamination.

Lawns in which yarrow is one of the species it is desired to retain should not be treated with hormones, as this species shows sufficient susceptibility to be severely affected. Left—Treated plant. Right—Untreated plant.

Placement of Crops

Susceptible crops should not be planted next to lawns that are to be treated with hormone preparations. Resistant crops or crops such as potatoes, peas, or maize that can withstand hormone treatments should be planted next to such lawns.

Later Treatment of Lawns

Foliage applications of hormone preparations are not toxic to the soil. Once the treated weeds are dead, a little lawn seed can be raked into the bare patches.

GRASS-WEED KILLERS

Unlike hormone weedkillers, which control broad-leafed flowering plants and are non-toxic to grasses, the grass-weed killers, T.C.A. and I.P.C., control grasses and are relatively non-toxic to broad-leafed flowering plants at normal rates of application.

T.C.A. is prepared mainly as the sodium salt of trichloroacetic acid. It is a white powder readily soluble in water. It is slightly corrosive and is irritating to the skin.

I.P.C. (isopropyl-N-phenyl-carbamate) is available in several forms: As

TABLE 2—LAWN WEEDS AND THEIR CONTROL WITH HORMONE WEEDKILLERS

Weed	Recommended formulation and rate of acid equivalent per acre	Most effective stage of growth	Time of year for treatment	Remarks
Susceptible Annuals and Perennials Buck's horn plantain (*Plantago coronopus*) Buttercups (*Ranunculus* spp.) Capeweed (*Cryptostema calendulacea*) Catsear (*Hypochaeris radicata*) Cut-leaved geranium (*Geranium dissectum*) Dandelion (*Taraxacum officinale*) Greater plantain (*Plantago major*) Groundsel (*Senecio vulgaris*) Hawkbit (*Leontodon hispidus*) Hawkweed (*Crepis capillaris*) Hoary plantain (*Plantago media*) Mouse-ear (*Hieracium pilosella*) Penny cress (*Thlaspi arvense*) Pennyroyal (*Mentha pulegium*) Ribgrass (*Plantago lanceolata*) Scotch thistle (*Cirsium lanceolatum*) Shepherd's purse (*Capsella bursa-pastoris*) Speedwell (*Veronica arvensis*) Storksbill (*Erodium cicutarium*) Twin cress (*Coronopus didymus*) Winged thistle (*Carduus tenuiflorus*)	Salts and amine salts of M.C.P. and 2,4-D (that is, water-based, non-volatile materials). Seedlings, 0.5lb.; older plants, 1.0lb. One application should give a complete kill	As seedlings, but plants are susceptible up to flower-head formation	Spring, early summer, and autumn	These weeds are also effectively destroyed with oil-based preparations if weeds susceptible only to oil-based preparations are dominant. Some of these weeds, such as speedwell and shepherd's purse, occur only in newly sown lawns
Daisy (*Bellis perennis*) Ragwort (*Senecio jacobea*) Stinging nettle (*Urtica dioica*)	Salts and amines of M.C.P. at 1.0lb.	As seedlings or from rosettes to flower-stalk formation	Late spring, early summer, or autumn	These weeds require repeat applications for control
Moderately Tolerant Annuals and Perennials Cudweed (*Gnaphalium luteo-album*) Onehunga weed (*Soliva sessilis*) Spurrey or yarr (*Spergula arvensis*)	Esters of 2.4-D. Seedlings, 0.5lb.; older plants, 1.0lb. Use non-volatile esters.	As seedlings, but susceptible to flower-stalk formation	Late spring, early summer, or autumn	Killed by one application of ester preparations of 2,4-D. Spurrey only occurs in newly sown lawns
Creeping mallow (*Modiola caroliniana*) Docks (*Rumex* spp.) Field chickweed (*Cerastium arvense*) Selfheal (*Prunella vulgaris*) Sorrel (*Rumex* spp.) Waxweed (*Hydrocotyle americana*) Yarrow (*Achillea millefolium*)	Esters of 2,4-D. Seedlings, 1.0lb.; older plants, 2.0lb.	As seedlings, but susceptible to flower-head formation	Late spring, early summer, or autumn	Require repeat application of ester preparations of 2,4-D for eradication

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TABLE 3—GRASS-WEED KILLERS

Type	Formulation	Acid equivalent per lb.	Form of weedkiller
T.C.A.	Sodium salt	0.8lb.	Water soluble powder
I.P.C.	Ester	Approx. 1.0lb. Approx. 1.0lb. Approx. 1.0lb.	Oil Wettable powder Dust

a powder that is dispersed with fertilisers, as a wettable powder that can be sprayed on with water, and in an emulsifiable form that readily dissolves in water or oil and can be applied as a spray. I.P.C. has no disagreeable properties.

Mode of Action

T.C.A. and the emulsifiable form of I.P.C. have a destructive contact action on the foliage of most plants, but the most important effect is the destruction of grasses by application of the preparations to the soil. The mode of entry is through the grass roots. For activation both materials require moist soil, and, if possible, applications should be made just before rain. On heavy soils up to 1in. of rain is required for activation. Both materials are more efficient on soils where leaching is not rapid.

I.P.C. is most effective as a killer of germinating seedling grasses, but will destroy established annual grasses at higher rates. T.C.A. will destroy both annual and perennial grasses. The most effective way of using T.C.A. is to apply the chemical to the upturned sod. Alternatively the grasses may be burnt or mown before the weedkiller is applied. Among the perennial grasses the rhizomatous twitches are the most susceptible to T.C.A., and the fibrous-rooted grasses the most resistant.

Discussion of grass-weed killers will be limited to the control of undesirable grass species in lawns and the eradication of troublesome grasses such as twitches in the garden.

Table 4 summarises the control of weed grasses in vegetable gardens. The low rate applies to areas with light, sandy soil and where there is a possibility of rain immediately after application. The high rate should be applied on heavy soils.

Grass Weeds in Lawns

Contrary to the procedure when hormone weedkillers are being used, lawns should always be mown just before the application of either T.C.A. or I.P.C.; this aids the efficiency of both preparations. The low rates of application of I.P.C. and T.C.A. necessary to eradicate germinating seedlings of annual weed grasses inhibit the growth of established perennials for a short period in the case of T.C.A. and for a somewhat longer period for I.P.C.

Grass Lawns

Annual weed grasses such as *Poa annua* may be effectively eradicated in established lawns of perennial grasses with low rates of application of I.P.C. and T.C.A. Where possible the application should be made on seedling growth of weedy annual grasses. T.C.A. is probably most suitable, as oversowing of the bare patches with desirable species could be carried out after heavy rain or after a month had elapsed. For suppression of germinating seedlings of annual grasses T.C.A. should be applied at 10 to 20lb. per acre.

Established perennial weed grasses such as paspalum and fog may be eradicated with spot treatments of T.C.A. A small quantity of T.C.A. is best dusted on to the weed grasses just before rain or it may be watered in.

Grass and Clover Lawns

As T.C.A. is more toxic to clovers than I.P.C. at usual rates of application, the latter should be employed for the control of annual weed grasses in established grass and clover lawns. T.C.A. applied at 10 to 20lb. per acre checks established clovers and destroys germinating clovers. I.P.C. should be applied at 1 to 2lb. per acre. Oversowing with grass species should not be attempted until the following season, but oversowing of clovers can be made as soon as the treated grasses are dead. As in the case of grass lawns perennial weed grasses should be spot treated with T.C.A.

Mixed Species

Both T.C.A. and I.P.C. can be employed successfully to suppress weed grasses in lawns of mixed species, though they may cause some foliage scorch.

[*Eric R. Booth photo.*

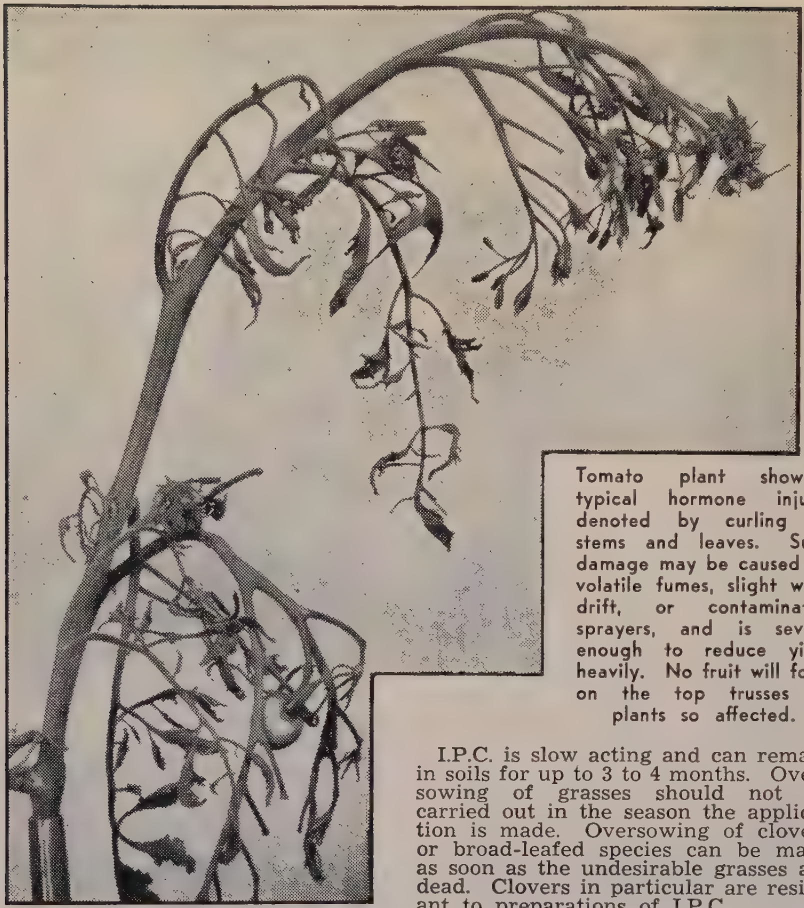
Young grape leaves are extremely susceptible to hormone damage. Such damage as that illustrated may be caused by minute traces of the weedkiller left in sprayers.

Later Treatment of Lawns

T.C.A. decomposes quickly in moist soils. At the low rates of application required to kill germinating seedlings of weed grasses, particularly on light soils, the material has decomposed by the time the treated grasses are dead. At high rates of application, such as spot treatments to established perennial weed grasses such as paspalum, the chemical could remain toxic for 1 to 2 months, depending on rainfall and soil type. On heavy soils several inches of rain and a month or two should elapse before oversowing of lawns with grass species.

TABLE 4—APPLICATION OF GRASS-WEED KILLERS

Material	Type of weed	Method of application	Rate per acre (lb.)	Rate per 100 sq. yds. (oz.)
I.P.C.	Annual and perennial seedlings	To soil after cultivation	1 to 2	Powder forms ⅓ to ⅔ Emulsifiable form 3 to 6 fl. oz.
T.C.A.			5 to 15	2 to 5
I.P.C.	Annuals (established)	To foliage	3 to 4	Powder forms 1 to 1⅓ Emulsifiable form 9 to 12 fl. oz.
T.C.A.			15 to 25	5 to 8
T.C.A.	Rhizomatous perennials (established)	To upturned sod	25 to 40	8 to 13
		After mowing, burning, etc.	30 to 50	10 to 17
		On rank growth	40 to 60	13 to 20
	Stoloniferous perennials (established)	To upturned sod	35 to 50	12 to 17
		After mowing, burning, etc.	40 to 60	13 to 20
		On rank growth	50 to 75	17 to 25
	Fibrous-rooted perennials (established)	To upturned sod	50 to 75	17 to 25
		After mowing, burning, etc.	60 to 80	20 to 27
		On rank growth	80 to 100	27 to 33



Tomato plant showing typical hormone injury, denoted by curling of stems and leaves. Such damage may be caused by volatile fumes, slight wind drift, or contaminated sprayers, and is severe enough to reduce yield heavily. No fruit will form on the top trusses of plants so affected.

I.P.C. is slow acting and can remain in soils for up to 3 to 4 months. Oversowing of grasses should not be carried out in the season the application is made. Oversowing of clovers or broad-leafed species can be made as soon as the undesirable grasses are dead. Clovers in particular are resistant to preparations of I.P.C.

Weed Grasses in Gardens

Rhizomatous grasses such as couch (*Agropyron repens*) and creeping fog (*Holcus mollis*) and stoloniferous grasses such as browntop (*Agrostis tenuis*) may be controlled with preparations of T.C.A. as indicated in Table 4.

The best method is to dig over the infested areas and apply the T.C.A. to the upturned sod. The soil should be further worked after an inch or so of rain has fallen and the area planted in the T.C.A.-tolerant crops listed below. In general, crops most susceptible to hormone preparations are most resistant to T.C.A. preparations. Such crops are swedes, turnips, cabbages, broccoli, cauliflowers, silver beet, kohl rabi, brussels sprouts, carrots, celery, parsnips, tomatoes, and peas.

Crops intermediate in tolerance could be planted after an inch or so of rain and after a month had elapsed. Such crops are pumpkins, marrows, melons, cucumbers, potatoes, and onions.

The effect of T.C.A. on species such as hedge plants and ornamental plants is not known, and this chemical should not be applied closer than several feet to such plants.

Danger to other Plants

The grass-weed killers are much safer to use than hormone preparations. Spray drift should be avoided and sprayers should be washed with hot soapy water after use. The emulsifiable preparation of I.P.C. should be treated as the most dangerous, and wind drift should be avoided. T.C.A. will corrode sprayers if they are not washed after use.

Keeping Properties

T.C.A. absorbs moisture from the air and cakes if exposed. It should be stored in airtight, non-metal containers. Preparations of I.P.C. do not deteriorate, but dusts should be stored in airtight containers to avoid contamination.

Spray Equipment

Most home garden sprayers may be used for applying hormone and grass-killing preparations. In all cases water is used as a carrier or distributor. A simple rule to follow is to apply the amount of weedkiller recommended in sufficient water to secure an even distribution and cover, but to avoid excessive run-off. The amount of water should be varied to suit the spray equipment available and local spraying conditions.

Points to Remember

Most lawn weeds may be effectively eradicated with chemicals without danger to associated plants provided the following precautions are observed.

Don't use volatile hormone preparations; use non-volatile materials.

Don't apply water-based hormone preparations when rain is imminent.

Avoid applying sprays and dusts in windy weather.

Avoid atomisation of spray; use coarse spraying nozzles.

Wash sprayers thoroughly after use.

Renew washers and hose after using oil-based hormone preparations.

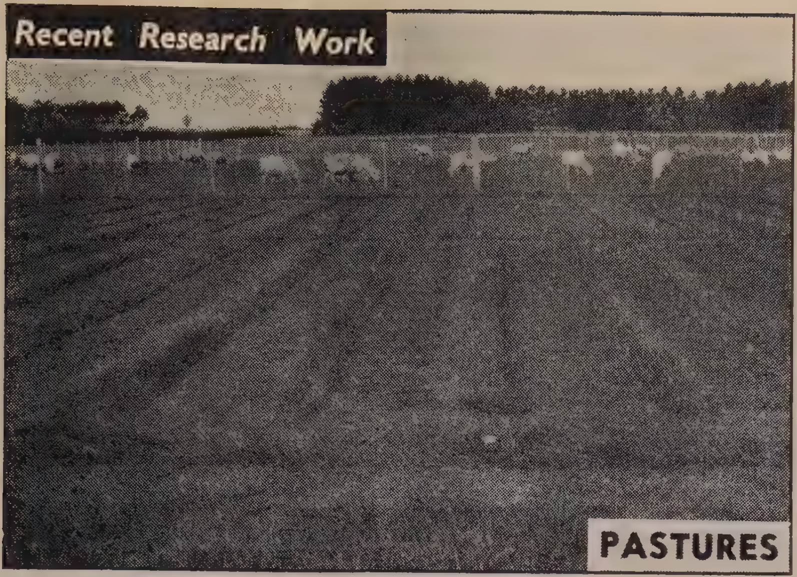
Store weedkilling dusts in airtight containers away from fertilisers and seeds.

Meteorological Records for November

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	59.6	+ 0.5	75.4	41.9	7.70	20	+ 3.86	1.14	5	188.0
Auckland	160	61.0	+ 0.6	73.2	48.2	7.03	21	+ 3.73	1.12	6	147.9
Tauranga	10	59.4	+ 0.6	73.1	39.3	9.14	24	+ 5.70	2.61	13	175.5
Ruakura	131	57.5	+ 0.1	73.1	40.0	8.03	23	+ 4.35	1.56	6	155.4
Rotorua	969	56.5	— 0.3	71.4	39.2	10.23	26	+ 6.25	2.37	13	129.2
Gisborne	12	59.4	— 0.1	77.6	41.6	4.62	18	+ 2.03	0.83	13	158.2
New Plymouth ..	160	57.8	+ 1.0	71.4	42.8	8.05	22	+ 3.34	1.07	21	160.3
Napier	5	60.6	+ 1.0	75.4	46.4	4.55	14	+ 2.46	1.18	25	148.6
Karioi	2125	51.6	— 0.3	66.0	33.0	9.17	23	+ 5.31	1.71	26	
Wanganui	72	59.2	+ 1.0	72.8	45.6	6.99	23	+ 4.37	0.82	8	140.3
Palmerston North .	110	57.6	+ 0.7	73.0	39.8	7.51	23	+ 4.65	1.75	8	118.4
Waingawa	350	56.7	+ 0.6	71.0	37.0	9.72	23	+ 7.02	2.37	27	125.4
Wellington	415	55.5	— 0.3	67.8	41.7	6.54	19	+ 3.17	0.93	26	144.8
Nelson	5	57.1	+ 1.6	71.2	40.8	8.82	18	+ 6.09	3.06	14	177.4
Blenheim	12	57.0	— 0.4	73.3	37.8	5.80	17	+ 4.09	1.50	27	174.5
Hokitika	12	55.4	+ 1.6	73.1	38.3	6.29	18	— 3.64	1.41	20	200.4
Hanmer	1225	52.2	— 1.6	71.6	32.4	9.71	19	+ 6.23	4.20	27	119.1
Christchurch ..	22	55.1	— 1.2	70.8	40.6	5.38	19	+ 3.56	1.48	6	151.5
Ashburton	323	53.3	— 2.4	69.0	37.8	10.10	22	+ 7.65	2.90	7	111.3
Timaru	56	53.7	— 1.8	73.8	37.5	8.81	16	+ 6.86	2.44	7	111.1
Alexandra	520	55.6	— 0.8	79.3	34.4	1.83	16	+ 0.75	0.34	26	172.1
Taieri	80	51.8	— 1.6	67.0	31.8	4.02	20	+ 1.74	0.88	7	145.2
Invercargill ..	0	51.4	— 0.4	77.6	31.1	3.30	18	— 0.34	1.28	18	182.5

Recent Research Work

PASTURES



THE testing of the productive capacity of pasture plants and the development of improved pasture-management methods form an important part of the field experimental work of the Extension Division. These notes cover the results of recent work on the seasonal changes in herbage production of 8 strains of ryegrass at Marton, trials with short-rotation ryegrass at Winton, the improvement of low tussock country, and the usefulness of granulated superphosphate.

RYEGRASS PRODUCTION AT MARTON

A TRIAL at the Marton Experimental Area measured the production from 8 different strains of ryegrass over a 5-year period. Samples of the mown herbage from this trial were separated into the different pasture species they contained and this made possible the study of the total and seasonal production from each of the ryegrass strains as distinct from the total herbage production of the swards of which these ryegrasses formed a part. The strains of ryegrasses showed differences in the proportion present in the mown herbage at various seasons of the year. Short-rotation ryegrass was relatively most prominent in winter, but the proportion declined steadily through spring and summer until there was least present in autumn. Italian ryegrass showed similar changes in the amount of herbage produced. Perennial ryegrass, on the other hand, was least prominent in summer, but recovered rapidly, so that there was almost as high a proportion of perennial ryegrass in the mown herbage in autumn as in spring. However, the greatest predominance of perennial ryegrass, as with short-rotation ryegrass, occurred during winter.

Other ryegrass strains in the trial were three lines from the Welsh Plant Breeding Station, a Grasslands Division, Department of Scientific and Industrial Research, "long-rotation" selection, and a line of "false" perennial ryegrass. The "false" and the Welsh "hay" strain (S24) were present in least amounts at all seasons. The other Welsh strains, "pasture" (S23) and "pasture-hay" (S101), behaved similarly to perennial ryegrass with respect to seasonal changes, although their winter production was lower and their total herbage production was much poorer. The "long-rotation" selection, on the other hand, was closely similar to short-rotation ryegrass in respect of changes in the amount present in the mown herbage at different seasons of the year.

—*P. B. LYNCH*

* * * *

SHORT-ROTATION RYEGRASS IN SOUTHLAND

A TRIAL at the Winton Experimental Farm compares a field sown with perennial ryegrass with one sown with short-rotation ryegrass. These ryegrasses were sown at about 30lb. per acre in their respective fields in December 1948 with 3lb. of red clover, 2lb. of white clover, and 5lb. of timothy per acre. A fair strike was obtained in both fields, but short-rotation ryegrass soon showed better growth than perennial. Measurements of herbage production began in the spring of 1949, and in the first year of measurement the short-rotation ryegrass field out-yielded the perennial ryegrass field by 24 per cent.; in the following year the difference was 34 per cent. in favour of short-rotation ryegrass. Increased yields from short-rotation ryegrass have been secured at all seasons of the year. This contrasts with results obtained in the North Island, where in most cases short-rotation ryegrass is higher yielding than perennial ryegrass in winter and early spring, and the reverse is true in summer and autumn. Although more research work is necessary to secure accurate data on the production of short-rotation ryegrass, there is no doubt that this grass will form a most useful addition to the pasture species sown in Southland.

—*W. FAITHFUL*

* * * *

GRANULATED SUPERPHOSPHATE

MOWING trials have been conducted over the past 2½ years at the Rukuhia Soil Research Station, Hamilton, and the Marton Experimental Area. In these trials various-sized granules which could be screened out of superphosphate were compared with the "fines" and with ordinary commercial superphosphate. This work was undertaken to see if granular material of a type suitable for distribution from aeroplanes gave as satisfactory a pasture response as ordinary commercial superphosphate. The fractions compared against "no phosphate" were commercial superphosphate passing ¼in. sieve, coarse granules retained on ⅜in. sieve and passing ½in. sieve, fine granules retained on ¼in. sieve and passing ⅜in. sieve, and "fines" passing an ⅛in. sieve. In both trials pasture production records over the trial period showed no significant difference among the various superphosphate treatments. However, it was noticeable that the finer fractions gave the quickest responses and these were generally superior in the winter after the annual autumn topdressings. The results indicated that from a long-term view all the granule sizes gave equivalent results. Considerations of obtaining the best distribution of fertiliser over the pasture and of securing the best response in winter shortly after application suggest that the best material to use for aeroplane application would be fine granules. The actual granule size to adopt must be considered in relation to the obtaining of accuracy in placement when the fertiliser is dropped from the aeroplane and in relation to the avoidance of loss of fertiliser in the dust fraction.

—*P. B. LYNCH and H. N. JESSOP*

* * * *

IMPROVEMENT OF LOW TUSSOCK COUNTRY

A TRIAL on unploughable low tussock country in the Waimate district has shown that clovers can be established by oversowing and topdressing with phosphatic fertiliser. The trial was laid down on typical tussock country consisting of hard tussock, browntop, Yorkshire fog, sweet vernal, flat weeds, and traces of white clover. Half of the area which had been treated with various phosphatic fertilisers was also oversown with Certified white clover and Certified Montgomery red clover. An excellent strike of clover was secured and a very marked response by these clovers to phosphatic fertiliser was noted. There were no manurial responses where clovers were not sown. As a result of this trial it is evident that an autumn sowing of 3lb. per acre of Certified white clover and 4lb. per acre of Certified Montgomery red clover together with an application of phosphatic fertiliser at the rate of from 1 to 1½cwt. per acre will result in considerable improvement on the less arid tussock grassland area.

—*J. L. SYMONS*

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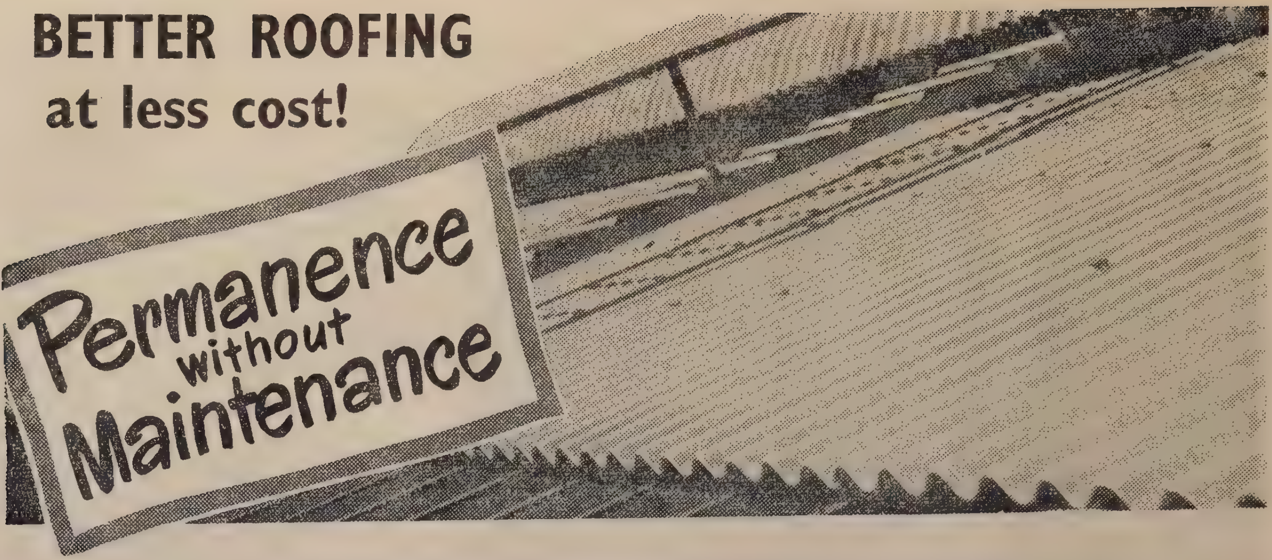
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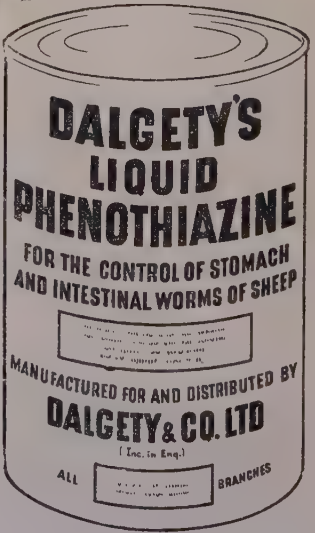
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Garden Friends and Enemies

Garden friend: Ground beetle (carnivorous).

WHETHER the chief pleasures of a garden lie in the quality or abundance of its plants or in the harmony of its features, the true gardener, who is also a nature lover, will be interested in the many tiny creatures to be found in it; in the spider no less than the gorgeously coloured butterfly; in their habits as well as their powers for good or harm. In this article by A. G. Kenneily, Horticultural Instructor, Department of Agriculture, Dunedin, a number of garden friends are mentioned and many of the commoner foes and control measures used against them described.

Garden enemy: Slug.

MOST of the creatures which inhabit gardens are known to the gardener only indirectly. They are too small to be seen by the unaided eye, as they include such minute organisms as fungi, bacteria, viruses, the protozoa, algae, and species of nematodes. Most live by the transformation or breaking down of organic matter and from the gardener's point of view serve a useful purpose. A few kinds of fungi and bacteria and practically all the viruses are injurious to plants and so too are those nematodes which invade plant tissues.

The larger creatures of the garden such as slugs, snails, wireworms, caterpillars, and beetles are better known, though comparatively few gardeners can correctly name more than a few; fewer can distinguish many of the garden friends from those regarded as foes. Even less is generally known by gardeners of control measures, though such knowledge is often the deciding factor between the success or failure of a crop.

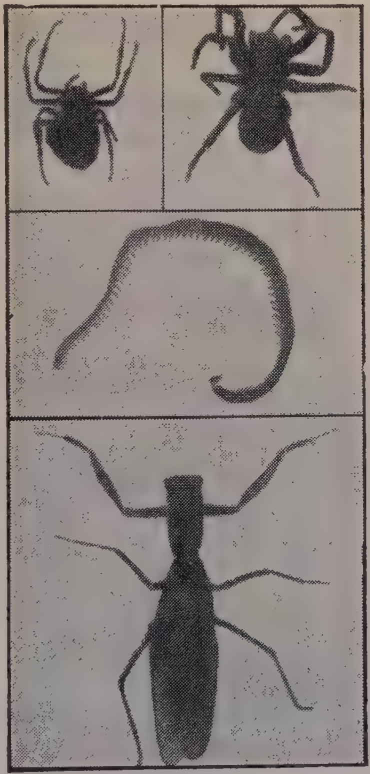
GARDEN FRIENDS

Garden friends include ladybirds and their dark, fearsome-looking larvae, strong-jawed carnivorous ground beetles, active and shiny black or brilliant greenish-gold, and rove beetles, sometimes known as the devil's coach horses from their habit of cocking their ends in the air when disturbed. The mantids, commonly called praying mantids from the way they stand and hold their saw-edged forelegs when waiting for their prey, alone among insects are able to direct their gaze.

There are also the spiders, so often inspiring fear yet almost invariably shy and harmless to humans, the dragonflies, looking in flight so like old-fashioned aeroplanes, and in the late summer there are the long-legged harvestmen, related to the spiders but often confused by casual observers with the long-legged crane flies, which are not garden friends.

In addition there are lace-wing flies and many kinds of wasps and a host of other creatures such as those commonly known as chalcid flies, ichneumon flies, scorpion flies, and hover flies, some of which belong to the bee group, each of which or its larvae preys on garden pests. There are predatory mites, thrips, earwigs, and slugs each of which preys on its fellows.

Other garden creatures have a less obvious value; they assist in pollinating flowers or are useful in hastening the decay of garden rubbish by the deposition of their eggs or their maggots or the spores of bacteria or fungi on it. The beneficial effect of earthworms in improving soil drainage and aeration, though sometimes overrated in the home garden, is well known.



Some garden friends. Upper left—Common orb weaver. Upper right—Hunting spider. Middle—The small New Zealand centipede, which is harmless to humans. Lower—Mantis.

All photographs on this page by Green and Hahn Photography Ltd.

GARDEN ENEMIES

Aphides

There are many kinds of aphides, variously known according to their colour or characteristics as plant lice or green fly, black fly, grey aphis, or woolly aphis. Almost all plants are liable to be attacked by one or more species, all of which are characterised by sucking mouthparts carried at the end of a rostrum or finger-like prolongation on the under surface of the head. The rostrum is used to puncture the plant surface. Aphides may be winged or wingless and are usually about the size of a small pinhead. They cause curling and distortion of the leaves, stunting, and wilting in hot weather when they are numerous. They also spread disease.

With the exception of woolly aphis, which is effectively controlled in most districts by the introduced parasite *Aphelinus mali*, aphides can be controlled by spraying in warm weather with nicotine sulphate at 1oz. to 4 or 5 gallons of water to which has been added an alkaline activator such as 1oz. of soap or hydrated lime. Alternatively on most plants H.E.T.P. can be used at 1 fl. oz. to 5 gallons of water. H.E.T.P. also gives fairly good control of woolly aphis if used with a suitable wetting agent.

Bronze Beetles

In appearance and habits bronze beetles are somewhat like the beetles of the common grass-grub, but they are oval, smaller, ⅛ to 3/16in. long, and light brown to almost black, whereas the common grass-grub beetle is about ¼in. long and uniformly brown. Both are New Zealand natives. The bronze beetle is active in daytime from November to January and chews leaves, giving them the appearance of having been subjected to a charge of shot. The skin of fruit and berries may also be damaged. Bronze beetle eggs are laid in the ground and the larvae develop there.

Control consists of clean cultivation and spraying with lead arsenate at 1¼oz. to 4 gallons of water or dusting or spraying with D.D.T. On deciduous fruit one D.D.T. spray 10 days after petal fall should give complete protection.

Caterpillars

There are many kinds of caterpillars in the garden, but whether they attack cabbage plants or other vegetables, fruit-bearing plants, or ornamentals practically all can be controlled by D.D.T. sprays or dusts. Arsenate of lead sprays at 1½oz. to 4 gallons of water also give protection in most cases.

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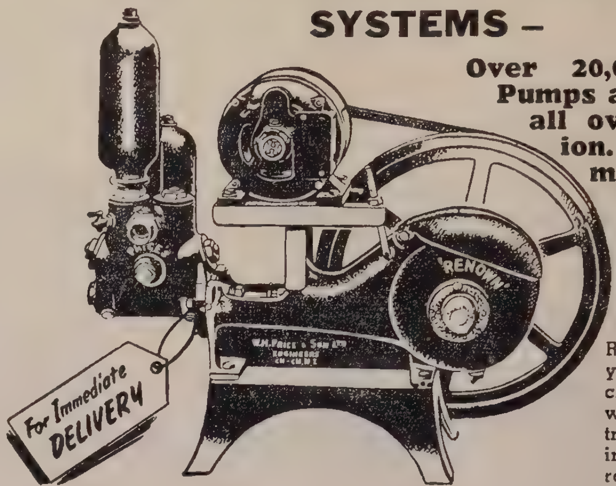
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Because bees may be killed, plants should not be sprayed with either D.D.T. or lead arsenate when in flower, and to avoid the risk from residual poison edible produce should not be sprayed up to 21 days before harvesting.

If spraying is necessary in that period derris dust, which is non-toxic to humans and breaks down very rapidly in sunlight or alkaline conditions, should be substituted. The caterpillars described below are dealt with more fully because of their methods of attack.

Cutworms and Army Worms

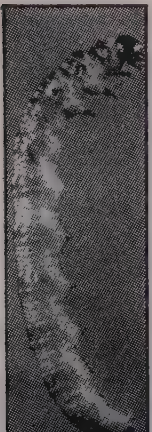
Cutworms are smooth-bodied, somewhat variable in colour, and rather sluggish. They are the caterpillars of different night-flying moths and are usually from ¾in. to 1½in. long. They get their name from their habit of cutting off young plants at the bases though they may also eat into lettuce and root crops such as beetroot. During the day they usually shelter in the soil at the bases of plants to emerge at night and feed. Army worms are somewhat similar to cutworms and get their name from their habit of advancing in hordes, usually in a single direction, stripping crops as they go.

Control consists of spraying or dusting the plant or the ground around it with D.D.T. or putting down a poison bait, which can be made of 1½lb. of bran with 1oz. of paris green or 1 to 2oz. of lead arsenate, ¼ pint of molasses or treacle, and about a pint of water. This amount is enough to cover 200 sq. yds. and should be used in a day or two, because it becomes mouldy if stored.

Subterranean Caterpillars

Subterranean caterpillars are often confused with grass-grubs, but are the larvae of harmless moths about 1in. long with wings variably marked but usually shaded black, brown, and tawny. The moths are rather sluggish and at night are often attracted to lights in houses. The different species appear at different times of the year. The eggs of the most destructive species are small, oval, and usually laid in October and hatch in 3 to 5 weeks. They are white when first laid, but most soon turn jet black. The caterpillars are greyish black, very small in November, but up to 3 or 4in. by about the end of August. During the day they lie in a tunnel they make up to about 10in. deep, but emerge at night, usually to eat grass foliage, rarely the foliage of other plants.

The subterranean caterpillar can be controlled to some extent by the use of the bait recommended for cutworms, but best results are obtained from use of D.D.T. or B.H.C. (benzene hexachloride) used according to the manufacturer's instructions.



Subterranean caterpillar.

Earwigs

Earwigs can be recognised by the forceps at the tail ends of their bodies. Some kinds lack wings, but the European earwig, which is the species responsible for most damage, has a pair of large elaborately folded wings hidden beneath a pair of short, hardened forewings, though it rarely flies. The European earwig has been established in parts of New Zealand for many years and occasionally attacks vegetables, seedling and other tender growth, flowers, and damaged fruit.

Earwig.

Earwigs shelter in daytime under such objects as stones, sacking, wood, or rubbish and thus can be trapped by laying folded or crumpled paper, short lengths of hollow stem—broad bean is useful—or similar material which can be shaken every day or two over a bucket of water containing a little kerosene or disinfectant. Alternatively D.D.T. sprayed or dusted on infested areas will soon reduce the population.

Eelworms

Gardeners frequently confuse eelworms (nematodes) with wireworms (see page 64), though apart from their worm-like shape and habit of injuring plants the two have little in common. Eelworms are of two kinds, the Gordian worms (commonly known as threadworms), which are the long hair-like creatures that sometimes appear in gardens after heavy rains, and the eelworms that attack plants, and which are mainly microscopic, the largest being only about 1/20in. long when fully grown. Some of the commonest kinds of eelworms cause small, knobby growths on fibrous roots not unlike the nodules on the roots of legumes and pimply outgrowths on tubers, and swollen twisted leaves and abnormally thickened stems on bulbous plants. Brown rings of dead or dying tissue can be seen if the bulb is cut through horizontally. Affected plants tend to wilt in dry conditions and usually have an unthrifty appearance.

Control is difficult and usually consists of fallowing the land for several years or growing only non-susceptible crops. Under glass, control usually consists of steaming the soil or treating it with chemicals such as chloropicrin, D-D, or formalin, methods not usually considered practicable outdoors because of the cost.

Grass-grub adult beetle.

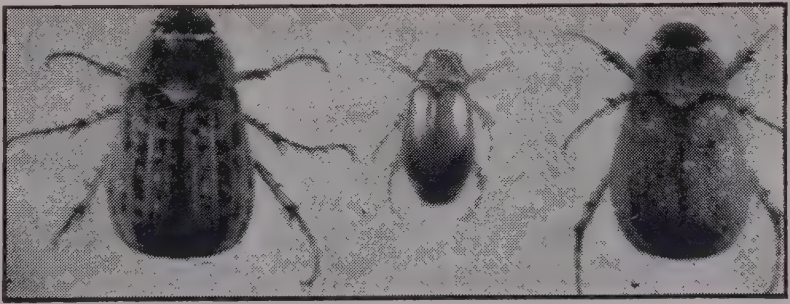
Grass-grubs and Cockchafer Beetles

There are a number of species of grass-grub, but the adult of the species causing economic damage is a shiny light to dark brown insect usually about ¼in. long. Beetles may be found in the soil from September; the first usually emerge in late November, and the last usually early in February. Other species may appear earlier. They feed on the leaves and flowers of a wide range of trees and shrubs, but prefer those in the deciduous group, though they also attack pasture plants and some crop plants.

The eggs are laid in clusters of from 3 to 40 a few inches below the ground surface. They are tiny, oval, and coated with a sticky fluid which enables them to adhere to dry objects. In moist soil the eggs after being laid may increase in bulk as much as 25 per cent. by the absorption of moisture. They hatch in about 2 to 3 weeks and the grubs go through three stages, gradually increasing in size and doing ever greater damage to roots until usually from about mid-May to October they change into beetles.

Grass-grub.

Small areas such as lawns and strawberry beds can be proofed against grass-grubs by applying 1lb. of arsenate of lead, preferably mixed with a carrier such as sand or fertiliser, to



Grass-grub adult beetles. Left—*Odontria striata*. Centre—*O. zealandica*. Right—*O. smithi*. All cause economic damage.

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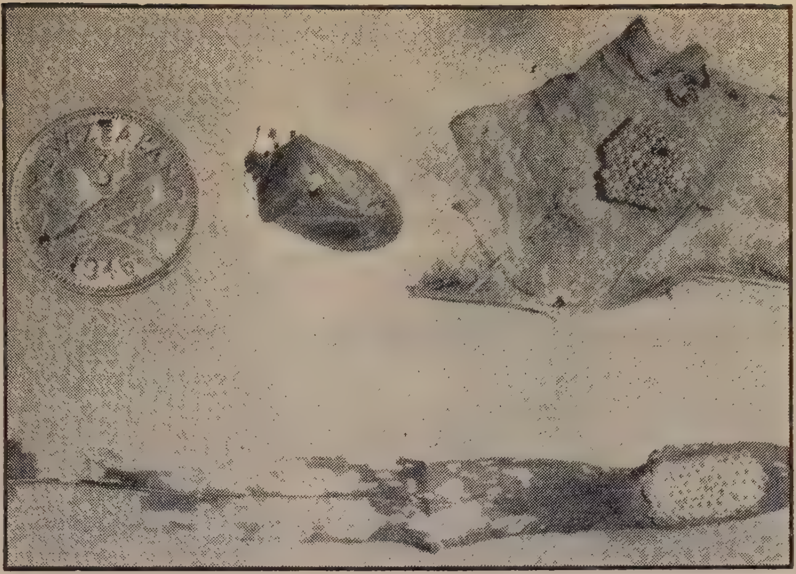
Green Vegetable Bug

Green vegetable bugs suck the sap of many kinds of plants, doing great damage. Their eggs which are about the size of a pinhead and pale yellow at first, later turning reddish brown, occur in rafts of from 40 to 80 eggs and hatch under favourable conditions in about 10 days. The somewhat spherical nymphs which appear develop in a succession of moults during which they may be brightly coloured—red, orange, yellow, black, and green. The adults appear after the fifth moult.

Important control measures include the destruction before October of weeds and rubbish on which the adults, which are then usually a dullish hue, may over-winter and the destruction in spring and early summer of the egg rafts. D.D.T. dusts and sprays give good control, though not as immediate as H.E.T.P. at 1 : 400; several days may elapse before D.D.T. treatments are fully effective. H.E.T.P. or derris dust should be used on edible produce during the 21 days before harvesting to avoid risk from residual poison, though H.E.T.P. at 1 : 400 may scorch the leaves of some plants particularly peas, broad beans, lettuces, tomatoes, and egg plants.

Leaf Hoppers

Leaf hoppers are narrow-bodied sucking insects about ⅛in. long, usually yellowish green or buff, with wings that fold to form a ridge. The young are wingless. These insects hop when disturbed. They cause a blotching or yellowing of the foliage—occasionally a fine spotting or peppering. On deciduous trees winter oil 1 : 20 is an important control, as the leaf hoppers winter in the egg stage. In the season of active growth they can be controlled by summer oil, ½ pint to 5 gallons of water plus 1 fl. oz. of nicotine sulphate, or by D.D.T. dusts or sprays.



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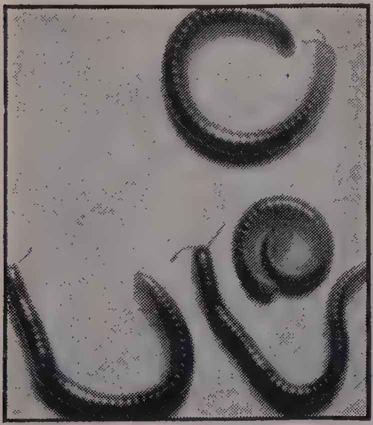
Green vegetable bug and egg rafts.



[Green and Hahn Photography Ltd. photo.

Millipedes.

Millipedes

Millipedes are sometimes wrongly called wireworms from their hard, wiry appearance. They are also often confused by home gardeners with centipedes, to which they are allied but from which they differ in having two pairs of legs to each body segment instead of one, bodies more rounded in cross-section, no poison legs, and shorter antennae and no distinct head. They are sluggish and tend to curl up when disturbed, whereas centipedes usually escape by running.

Centipedes are carnivorous and feed mainly on small slugs, worms, and insects. Millipedes feed mainly on decaying vegetable matter, though some species attack plants; in particular they may attack sprouting seed that has failed, seedlings, or potato tubers that have been damaged by slugs or wireworms or by implements.

Control, apart from clean cultivation and the removal of rotting or damaged vegetation in which they may breed, consists of trapping as recommended for the control of wireworms or applying B.H.C. or D.D.T. dusts to the soil.

Mites

Mites are allied to spiders and ticks and differ from insects in many respects. For instance they have no wings, no distinct head, the thorax and abdomen are continuous, and the adult has four pairs of legs (though in the nymphal stage, like insects, only three). They may be translucent, whitish or yellowish, pink, green, brown, red-brown, red, or purple. Mites are tiny; some cannot be seen with the unaided eye.

A few kinds of mites cause galls on the leaves of such trees as pear and walnut, others rasp foliage and by sucking the exuding sap destroy the green colouring matter (chlorophyll), and so reduce the power of the plant to manufacture plant food. Mites attack a great range of fruit, vegetables, and decorative plants.

One of the most troublesome mites in home gardens is known as the red spider mite from its habit of webbing the under sides of leaves and because in late summer or autumn it turns from its early-season green or yellow-green to bright red. Its increase, like that of most other species of mite, is favoured by hot, dry weather. It can be controlled by spraying with H.E.T.P. 1 : 800 as also can clover mites, which occasionally migrate and stay for a time on horticultural crops, and red legged earth mites, which attack vegetable crops and certain other crops in some districts. D.D.T. dusts and sprays also are effective against the red legged earth mite, but D.D.T. should not be used against the European red mite, which is very troublesome on apples and other plants. European red mite is controlled in the active stage by summer oil 1 : 100 or H.E.T.P. 1 : 800 and by spraying the eggs on dormant trees with winter oil 1 : 20.

Blister mites can be controlled by spraying with lime sulphur, usually at 1 : 150 in autumn, when the mites are taking up their winter quarters, and again in spring at bud movement, when the mites are moving out from the shelter of the bud scales.

Bulb mites are usually destroyed by fumigation or hot water treatment.

Scale Insects and Mealy Bugs

In the non-motile forms commonly seen scale insects are not readily recognised as insects, as in that form, though different species vary greatly

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in size and appearance, they are commonly characterised by a leech-like, scale-like, or shield-like appearance. They may vary in colour from white to grey, black, brown, or red, and in size from minute to about 1/5in. long. They may be narrow, circular, oval or shell-like, ridged, or serrated. Many species exude a sticky honey dew, on which a sooty mould develops.

Control varies a little with the species, but on deciduous trees usually begins with a winter oil spray of 1 : 20 when the trees are dormant. This is followed by summer oil sprays at 1 : 100 at 14- to 21-day intervals when the young scale insects are emerging from the protective cover of the adult and moving about actively, usually in January and February, though the period may be extended considerably and the strength of the sprays increased up to 1 : 30. For most effective control, the scale should be identified so that sprays can be timed correctly and used at the correct strength. The sensitivity of the plant to oil should also be determined if the stronger formulations are used.

Mealy bugs belong to the same group of insects as scale insects, but unlike scale insects retain their legs and power of movement throughout their lives. They are somewhat like slaters, but are much smaller and have a fringe around their body margins and in some species a quite considerable tail and are covered with a powdery or mealy waxy protective secretion. Control is generally similar to that for other scale insects, though in certain instances, for example on dormant grape vines, very heavy applications of wettable D.D.T. have given good results. Mealy bugs have a number of predators, which reduces their numbers.

Pear Slug and Sawfly

Plums, cherries, pears, peaches, hawthorn, and almonds are sometimes infested by the slug-like larvae of the sawfly, which eat the leaf surface, leaving only the leaf skeleton. The larvae are club shaped (the head end enlarged), slimy, and whitish at first, and later dark or olive green. When fully fed they lose their slug-like appearance and become yellow with a dry wrinkled skin. The adult fly is black and about 1/3in. long, rather thick, with four transparent wings and gets its name from its saw-like ovipositor (egg depositor). The larvae are readily controlled by spraying with arsenate of lead at 1¼oz. to 4 gallons of water.

Slaters

Slaters are also known as pill bugs or woodlice and, with certain crabs, are among the few crustaceans that are able to live fairly successfully on land. They can survive only by living in moist places, as they breathe by gills. The young are carried in specially modified body parts on the under sides of the females. Slaters are nocturnal, mainly scavengers, but are occasionally carnivorous and may also damage seedlings or tender foliage such as maidenhair fern. Spraying or dusting their runways with D.D.T. will give control.

[*Green and Hahn Photography Ltd. photo.*

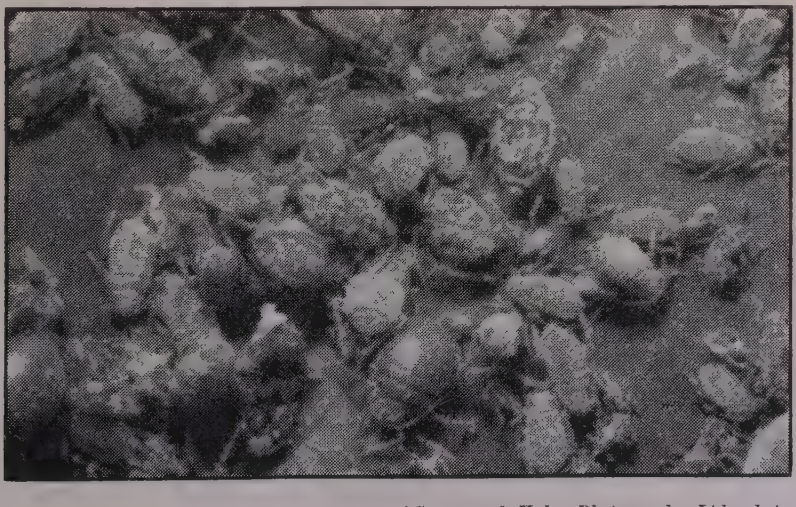
Woodlice (slaters).

Slugs and Snails

Slugs and snails are molluscs, as are cockles, clams, oysters, octopuses, and squids. There are several species each differing in colour and size, but their habits generally are similar. They are voracious, mainly nocturnal feeders and shelter in cool, moist situations in daytime. The feeding habits of the various species differ slightly; some eat plant parts well above ground, others at soil level; and others tunnel and eat basal parts, tubers, or lower roots. In dry or freezing weather slugs usually burrow into the soil, emerging whenever temperatures and moisture are favourable. Snails usually hibernate during severe winter weather, usually in dry, sheltered situations.

Slugs and snails are difficult to control in damp conditions where growth is heavy and are usually most destructive in wet seasons. As they are hermaphrodite, every individual can lay eggs.

The best control is a bait of 1oz. of metaldehyde mixed with bran or similar feeding stuff and broadcast thinly or placed in small heaps about 12in. apart over infested areas on a mild evening when the soil is damp. Bait left in heaps should be covered with material such as small pieces of wood to protect it from birds and prevent rain reducing its efficacy; if so protected it will remain effective for weeks.



[*Green and Hahn Photography Ltd. photo.*

Grey aphides on cabbage.

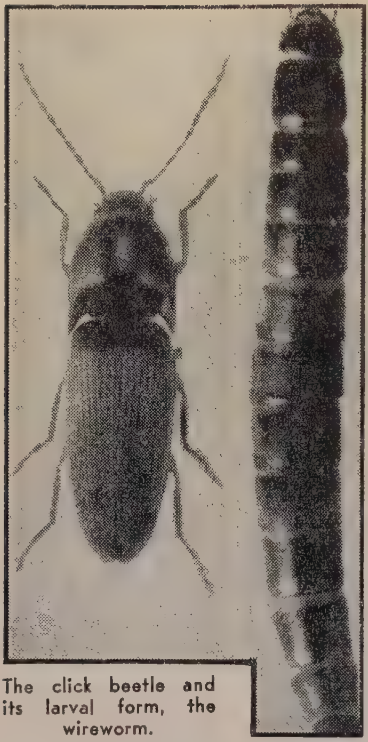
Slugs and snails tend to return night after night to the food they have become accustomed to and as far as practicable baits should be applied before they have acquired the taste for other food. Metaldehyde is attractive to them and quick acting, making them incapable of movement, though if they have not had a lethal dose they recover to some extent the next day and unless caught by sun or birds or other enemies may escape.

In small gardens slugs and snails can also be controlled by spearing them at night and dropping them in a bucket of salty water.

Copper sulphate has also proved effective as a contact poison, though it is injurious to the foliage of many plants. Copper sulphate should be dehydrated, by heating it until it is finely powdered and almost white, and then mixed with about nine times its weight of hydrated lime. The mixture should be broadcast on a mild evening on the area frequented by the slugs or snails. Alternatively finely powdered copper sulphate can be mixed with equal parts of lime or fertiliser and broadcast thinly.

Springtails

Springtails (collembolas) are primitive wingless insects, and though a few species do not have appendages and are incapable of springing, they get their popular names because the common species have a pair of appendages at the ends of their abdomens which enable them to spring into the air. There are two principal kinds. The first are small, rather globular, and black, brown, or yellow, the largest common species being about the size of a pinhead and superficially resembling an aphis. They eat small, irregular holes in the leaves of plants and jump strongly if disturbed. The second kind are bluish grey or white insects rather like tiny pieces of thread or cotton. Though some in this group attack cultivated mushrooms, most species are harmless and commonly occur in vast



The click beetle and its larval form, the wireworm.

numbers on compost or in damp soils rich in organic matter. Usually they are attracted to rotting vegetation such as damaged bulbs or corms, seeds that have failed to germinate, or strawberries damaged by birds, slugs, or snails. They are occasionally blamed for damaging young plants and may be capable of it, but usually plants apparently attacked by them are unthrifty because of environmental conditions such as poor drainage, excess damp, or insufficient aeration.

All species of springtails can be controlled by D.D.T., but B.H.C. or sprays of H.E.T.P., 1 fl. oz. to 5 gallons of water, or nicotine sulphate 1 : 800 plus soap, are usually employed against those in organic matter.

Thrips

There are several species of thrips, but generally they are minute, elongated, 1/15 to 1/25in. long, and rather pointed at both ends. The adults, which are usually yellowish brown to brown or black, have two pairs of narrow, fringed wings, which enable them to fly considerable distances. The nymphs resemble the adults in shape, but are wingless, usually green, yellow, or yellowish brown, and do not move far from their feeding area.

Mixing Sprays

The following may be of assistance in the working out of spray mixtures:—
1 gallon = 4 quarts = 8 pints = 160 fl. oz.

Strength	Spray material pints	Water gallons
1 : 20	1	2½
1 : 30	1	3¾
	fl. oz.	
1 : 50	½	3 (approx.)
1 : 100	5	3 (approx.)
1 : 150	4	3¾
1 : 400	1	2½
1 : 600	1	4 (approx.)
1 : 800	1	5

Thrips rasp the leaves and suck the sap, often producing on plants such as tomatoes a silvery effect. They are favoured by warm weather and attack a great range of flowers, fruit, and vegetables, often spreading disease. They can be controlled fairly effectively by D.D.T. dust or spray or H.E.T.P. spray at 1 : 800.

Wireworms

Wireworms are worm-like grubs, but are hard and wiry with a segmented outer casing, usually reddish brown or brownish black. They have three pairs of legs behind their heads, which have powerful jaws with which they eat germinating seeds, plant roots, tubers, insects, or even other wireworms. They are the grubs of long, comparatively narrow, hard black beetles. These beetles usually can be distinguished from the beneficial carabids (hunting or ground beetles) by the lack of pincer-like jaws and metallic colours and by the apparatus on the under side of the first two segments of their thorax (the middle segment of the body) which enables them when turned on their backs to right themselves with a click, from which has arisen the common name click beetle.

In the past for the home gardener control of wireworms has usually consisted of clearing away all rubbish likely to harbour the beetles and the use of baits such as potatoes, seed, or vegetable parts, buried an inch or two under the ground and marked with a stick. After a few days the baits are dug up and the wireworms attracted to them destroyed. In fallow ground the method is fairly successful if persevered with, but the most effective control is to dress the soil with D.D.T. dust or with B.H.C. (sometimes sold mixed with fertiliser). Some forms of B.H.C. taint root crops and should therefore be used with caution. It may be necessary to wait until the crop is dug before applying the insecticide, and even then there may be a risk of residual taint affecting crops such as potatoes and carrots planted subsequently.

Vegetable Weevil and Grub

The vegetable weevil is dark brown or greyish brown, about 1/3in. long, and rather slim with a typical snout. It has a greyish white V on the back. The fully grown grub is ½in. long, plump, legless, and sluggish, green to greyish green, and has a blackish brown head. Adults hide during the day, usually about the bases of plants. The weevils are particularly destructive to carrots, beetroot, lettuce, potatoes, tomatoes, and turnips, and feed on a wide variety of weeds. Crowns of seedlings are commonly eaten out.

To control the weevil clean cultivation should be practised, though destruction of weeds late in the season will cause the weevils to migrate to crop plants. Poison bait as advised for cutworms or D.D.T. dust or spray can be used. If an insecticide is needed during the final 21 days before harvesting, derris should be used.

Spraying

Growers of commercial crops and groups of home gardeners may obtain information on spraying and spray materials from local officers of the Horticulture Division of the Department of Agriculture.

It is advisable to use only those therapeutants (spray materials, dusts, etc.) that have been certified by the Plant Diseases Division of the Department of Scientific and Industrial Research. Notice of certification is carried on the label.

Precautions

H.E.T.P. (hexaethyl tetraphosphate) is sold under a trade name and is a deadly poison. It should not come in contact with the body. On some plants it may cause burning of foliage, particularly at strengths greater than 1 : 800. Nicotine sulphate is also a deadly poison sold under various trade names. It loses effectiveness the lower temperatures are below 70 degrees F. and requires an activator such as hydrated lime or soap. Unlike arsenate of lead or D.D.T., H.E.T.P., nicotine sulphate, and spraying oil do not have appreciable residual effect and produce can be eaten within a few hours of spraying if washed in the ordinary way. A 21-day period should precede the harvesting of produce sprayed with arsenate of lead or D.D.T. D.D.T. for horticultural dusting or spraying is sold, at different strengths, usually in a carrier such as kaolin or talc and should be used according to the manufacturer's instructions.

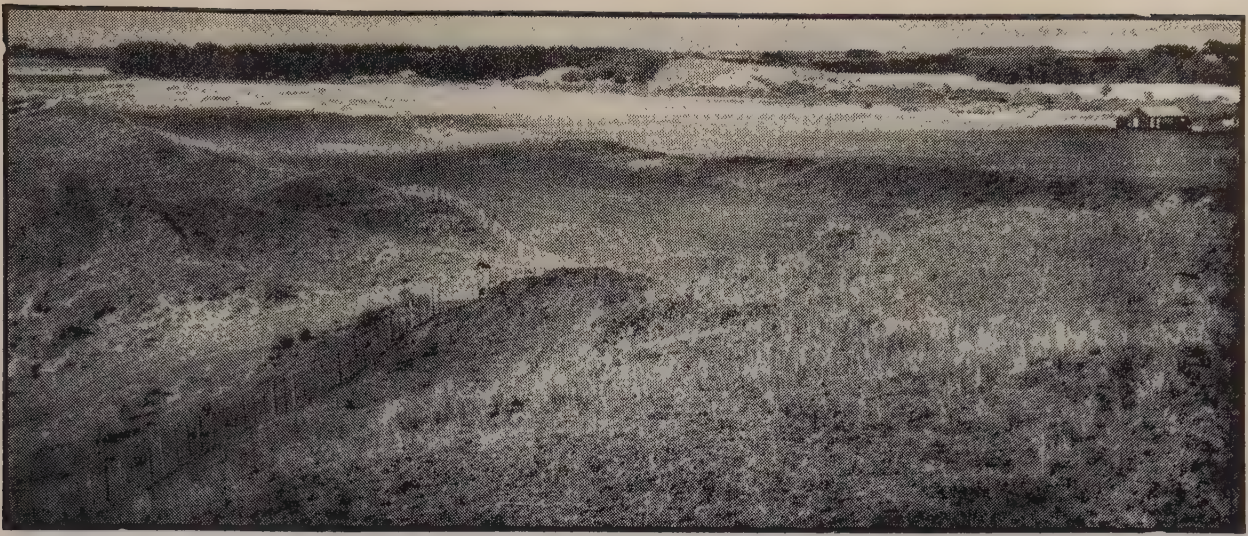
Kerosene-based formulations of D.D.T. as used for domestic purposes such as fly sprays are injurious to plant tissue and should not be used in the garden.

Basic lead arsenate is recommended on stone fruit trees in preference to acid lead arsenate, and where arsenate is used twice its weight in hydrated lime should be added.

Winter oils must not be used in summer. Oil sprays are prepared by stirring the oil, pouring the required amount into a clean container, then slowly adding an equal amount of water and stirring vigorously until an emulsion has been formed and no free oil is present. The emulsion can then be added to the bulk of the water, the whole being stirred vigorously. A little washing soda can be added if the water is hard.

Danger of Spraying Haystacks with Copper Sulphate

THE spraying of haystacks with copper sulphate (bluestone) has been suggested as a means of preventing mould growth. A solution of bluestone at a concentration of 2lb. to 3 gallons of water has been successfully used for this purpose on an experimental scale. However, analyses of hay samples at the Rukuhia Soil Research Station indicated that this is a potentially dangerous method of preventing wastage. The spray penetrated at least 2ft. into the stack and a considerable amount of the hay in this fraction contained sufficient copper to render it toxic to sheep or cattle.



Developing Sand Dune Country at Flock House Farm of Instruction

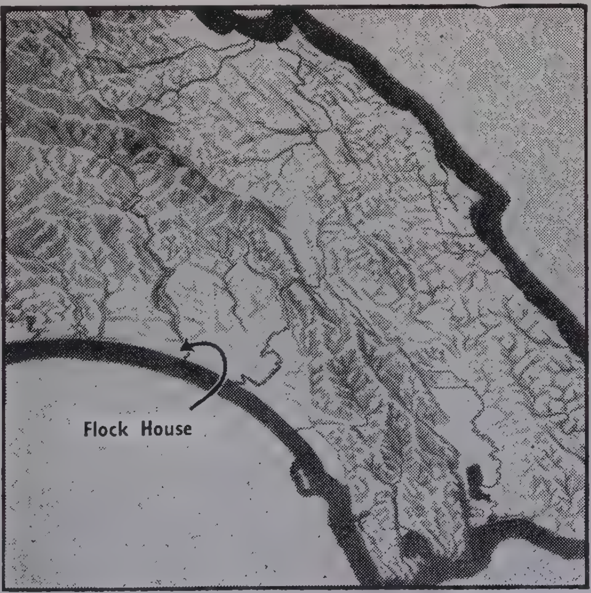
FLOCK House Farm of Instruction is 9 miles from Bulls in Rangitikei County on the west coast of the North Island. The property, which has a coastal frontage of approximately 3 miles, consists of just over 8000 acres, of which some 6000 acres is being farmed or is in the process of development. The remaining 2000 acres forms a belt of moving sand which lies along the coastal frontage and part is utilised for afforestation. The country inside this afforestation area consists of semi-consolidated sand dune country which is being developed, and in this article E. B. Glanville, Farm Superintendent, Department of Agriculture, Wellington, describes the methods which have proved successful in bringing this type of land into production. Subsequent articles in this series, which will be contributed by other officers of the Department, will deal with stabilising sand country, drainage, and training at the farm.

IN its undeveloped state this type of sand dune country is covered with tall to stunted scrub, lupin, and gorse; in the lower-lying areas cabbage trees and *Phormium tenax* are scattered through the scrub covering. Development can be done by one of three methods:—

1. Clearing the scrub covering by hand cutting and burning and then by surface cultivation with giant disc harrows or ploughing with a giant swamp plough.
2. Crushing the scrub covering with a heavy tractor-drawn roller and then by burning and ploughing with a giant swamp plough.
3. Ploughing under the scrub covering with a giant swamp plough.

Modern Methods Necessary

When development of this country began at Flock House Farm of Instruction the hand method of clearing was done, but was found to be so slow and arduous that more modern methods were found necessary to bring in an appreciable area each year.



Surface cultivation with giant disc harrows after clearing was thought to be sufficient to prepare a seed-bed for grass seed and to have the advantage of holding the land in a consolidated state, but reinfestation of gorse was apparent, especially from the strong roots of the large bushes the tops of which had been cut and burnt during clearing. To prevent this and to kill the large gorse roots it was necessary to plough the cleared land deep enough to get under the roots and move them. To do this a giant swamp plough drawn by a 40 h.p. track-laying tractor turning a furrow 2ft. 6in. to 2ft. 9in. wide and 12in. to 14in. deep was used with success.

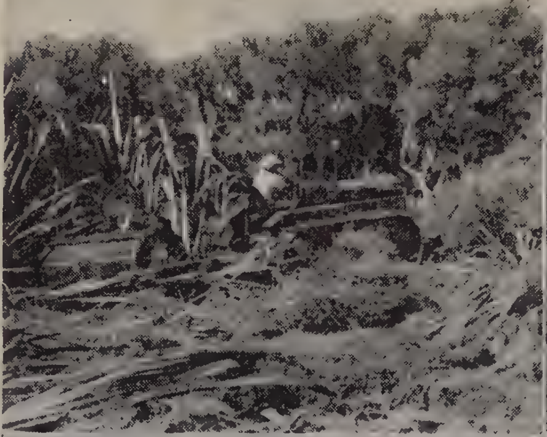
Ploughing under Scrub

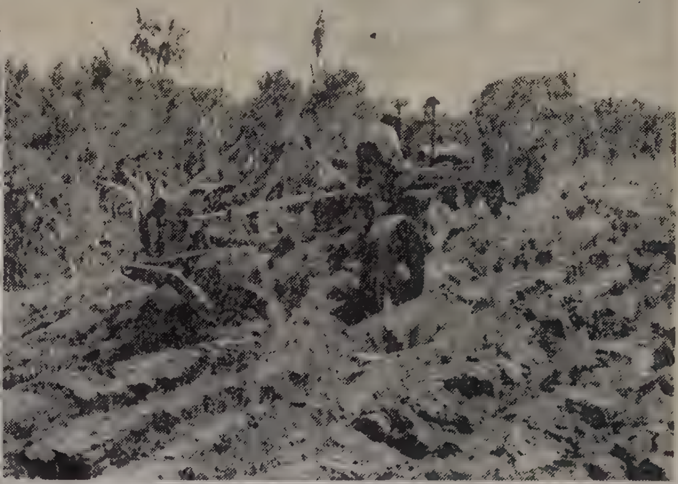
Sand-country development at Flock House Farm of Instruction has been carried out as far as possible by the third method. With the equipment available this has been found to be the quickest and most economical way of bringing this type of sand country under the plough and finally into grass. Only on the areas where the scrub is exceptionally heavy has it been necessary to divert from ploughing it directly under the furrow. Here it is broken down with a heavy crushing roller and fired before ploughing.

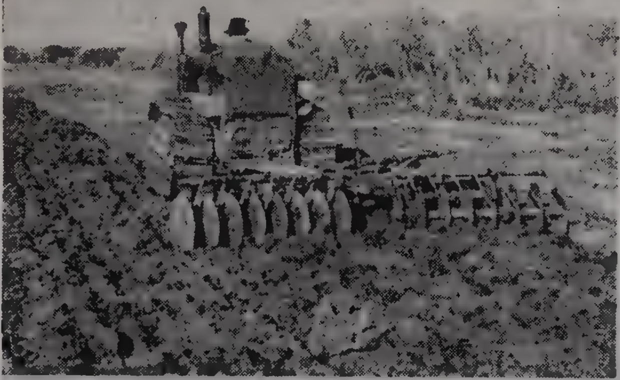
Country Exposed to Strong Winds

This country is exposed to the strong winds which blow in from the west coast, and it is unwise to leave it for any length of time in the bare furrow slices. Any areas ploughed during winter are worked down and put into spring crops such as rape or turnip to hold the country from blowing. Immediately after they are ploughed, the huge furrow slices turned over with the giant swamp

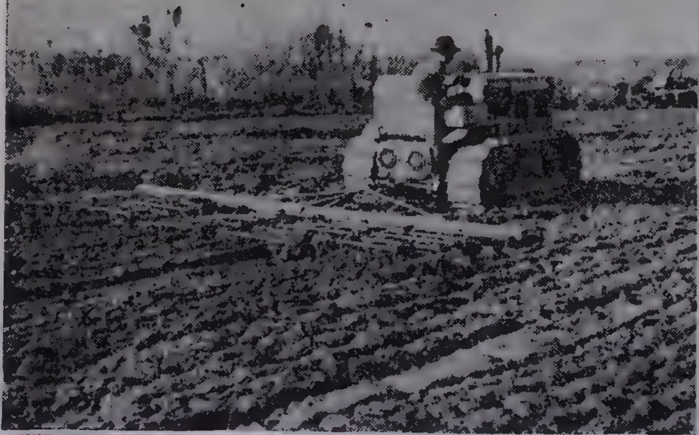
DEVELOPMENT OF SAND DUNE COUNTRY







Upper left—Crushing dense, heavy scrub and *Phormium tenax* growth on undeveloped sand country at Flock House with heavy track-laying tractor and water-filled crushing roller made from an old steam boiler. Upper right—Ploughing under standing scrub on sand country with giant swamp plough and heavy track-laying tractor. The large size of the furrow slices should be noted. A heavy chain is attached to the plough to drag scrub under the furrow. Left—Tandem-disc harrowing ploughed and rolled sand country. Lower left—Tine harrowing sand country after discing. Lower right—Huge furrow slices on ploughed sand country after they had been packed down with a heavy roller before the starting of cultivation work.



plough are rolled down with the heavy scrub-crushing roller, given one stroke of the tandem-disc harrows and one stroke of either the tine or chain harrows, and then one stroke with the Cambridge roller; this is generally sufficient preparation for sowing the crop. Areas cropped in this way are sown to grass during the next autumn by surface sowing the grass seed mixture and tramping it in with a large mob of sheep. In this way the grass seed is sown and establishes on a thoroughly consolidated seed-bed.

Sowing of Areas

Areas ploughed during spring are sown immediately to chou moellier and swedes to provide feeding during the next winter. After the crops have been fed off, the land is lightly worked up in spring and sown to rape, and then grassed down the next autumn. Summer-ploughed areas are sown straight to grass after a well-rolled consolidated seed-bed has been prepared. If the work is planned in this way, the land is not left bare for any time, which is a very important factor when bringing in sand country because of the likelihood of this light, sandy soil blowing during the windy spring and early summer.

Development Work

Development work is confined to the flat portions which are damper and more fertile than the hills or sand dunes and do not blow during the process of cultivation as much as the dunes. The dunes have to be treated differently to keep them stable and they are therefore only lightly hand cleared of scrub. As it is essential to keep the dunes covered with vegetation, clearing is done in late summer and the next step is surface sowing a mixture of subterranean clover 2lb., white clover 1lb., and perennial ryegrass 10lb. per acre with superphosphate at 2cwt. per acre. This treatment has been found successful for establishing a grass and clover cover on the dunes, and with proper stock management the cover and growth improve rapidly.

Drainage

The formation of sand dunes has upset the natural drainage of the flat areas and in places the dunes have caused lakes to form. Because of this many of the flat areas lie very wet and have to be drained before grassing down can be carried out successfully. Drainage of sand country is best done by the V-drain method. These drains should be formed just before sowing down so that they can be sown with grass and clover seed when the cultivated area is being grassed down.

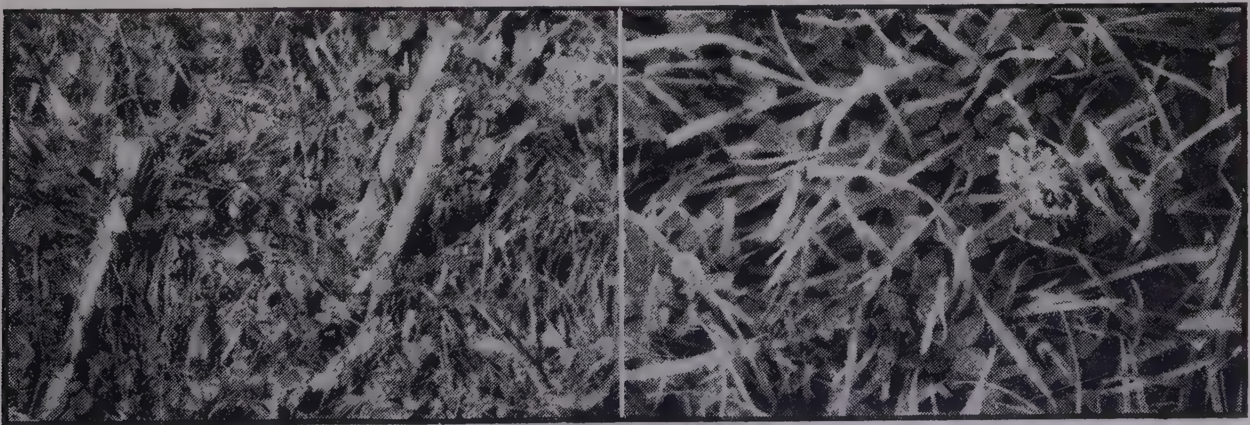
The V-drain type of drainage, which is so suitable on sand country, will be dealt with in a special article.

Grassing

A firm, consolidated seed-bed is important when establishing pastures on cultivated land, and when sand country is being grassed this point cannot be stressed too strongly.

The huge furrow slices which are turned by the giant swamp plough used on this country must be packed down with a very heavy roller before any cultivation work is begun. To do this successfully a roller weighing at least 3 to 4 tons is necessary. The

Transplanting turf of strawberry clover to introduce this valuable clover species into wet sand patches.



Left—Excellent establishment of young pasture sown on rape stubble where grass seed mixture was trampled in by sheep. Right—A high-producing pasture on sand country. It consists of ryegrass, cocksfoot, white clover, and a little subterranean clover.

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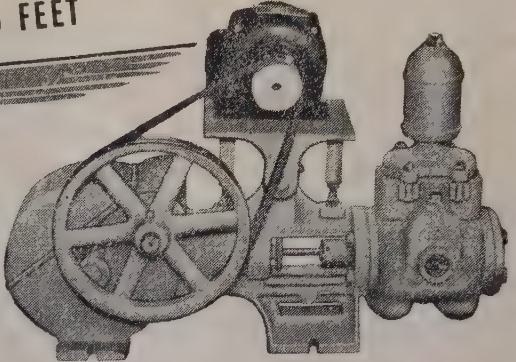

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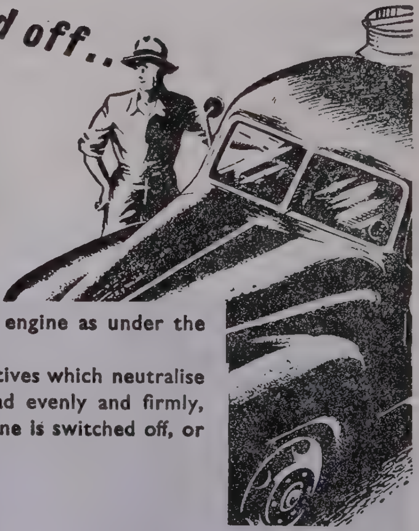

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Light summer grazing is important on young sand-country pastures to enable the young clover plants to establish in the shade of the higher-growing grasses.

roller illustrated on page 66 at work crushing heavy scrub is also used at Flock House Farm of Instruction for compacting the furrow slices left by the giant swamp plough. It has been made from an old steam boiler which is filled with water to obtain the necessary weight. When full it weighs 3½ tons.

After the furrow slices have been well packed down with the heavy roller, cultivation work can be begun for grassing. One stroke of the tandem-disc harrows and a stroke of the tine or chain harrows are generally sufficient cultivation for this type of country. In places some levelling is often necessary before the seed-bed is prepared finally, and this is done with a railway line leveller after the discing. The final operation in preparing the seed-bed is to roll it with a Cambridge roller. The grass seed mixture is then broadcast, being covered with a light chain harrow, and finally the seed-bed is rolled again with the Cambridge roller.

Where the land has been in a crop such as rape the grass seed mixture is broadcast on the rape stubble and tramped in with a large mob of sheep. This method of sowing has given an excellent strike of grasses and clovers with a subsequent rapid establishment of a strong, tight sward which is even better than that obtained when the sowing is done immediately after ploughing.

Sand country should be sown to grass during autumn and it is wise to delay sowing until after the autumn rains, which are generally in late March. This allows the seed to be properly covered and stabilised in the sandy seed-bed by the final rolling.

The grass seed mixture which has given good results on this country consists of:—

	Per acre (lb.)
Certified short-rotation ryegrass	15
Certified perennial ryegrass	10
Certified cocksfoot	8
Certified white clover ..	2
Certified red clover	2
Subterranean clover	4
Total	41

Isolated patches on the sand areas lie damp or wet for a great part of the year and on these areas strawberry clover at 1lb. per acre should be added to the mixture. This species of clover thrives on damp or wet sand soils and should always be included in the mixture for sowing these isolated areas. Strawberry clover seed may be sown separately by hand on the damp patches before the final rolling, or it may be introduced the next year by transplanting strawberry clover turves taken from established swards. Convenience governs the method used, but the introduction of strawberry clover in these damp or wet areas as an addition to the general grass seed mixture should not be neglected.

A tight pasture sward of subterranean clover and ryegrass on sand country.

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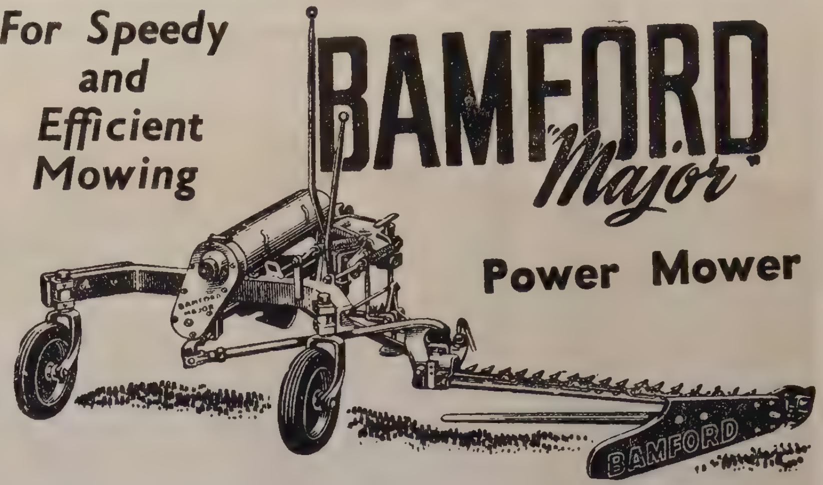

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Young dairy cattle and sheep grazing sand-country pastures. Young cattle are ideal for grazing sand-country pastures, especially when the pastures are young and establishing.

Fertilisers

Lime is not necessary on this soil type, but a dressing of phosphate (preferably superphosphate) at 3cwt. per acre is necessary at sowing. It is advisable to apply a further dressing at 2cwt. per acre to the young pasture during the first spring to stimulate and promote a strong growth of clovers and grasses so that a tight pasture sward will develop as soon as possible. Subsequent phosphatic topdressing should be carried out each autumn at 3cwt. per acre. Sand soils also respond to potash, and muriate of potash at the rate of ½cwt. per acre should be applied annually with the phosphatic fertiliser.

Management

The management of pastures established on sand country calls for special knowledge and attention. Careless close grazing by sheep will ruin pastures on this type of country in the first year. They must be grazed leniently, particularly during the summer, in the first few years of their establishment and be permitted to go through summer on the long side so that the grasses will provide a cover. It is advantageous to allow the ryegrass to do a certain amount of reseeding. The protection given by the grasses gives the clover plants shade during the hot period of the year and provides cover for subterranean clover seedlings to establish. Pastures managed in this manner, particularly through summer, soon develop a good, tight sward that will stand up to grazing and the hot, dry, windy periods experienced. If the grazing is done wholly by sheep, it is practically impossible to manage the young pastures properly. The close grazing of sheep promotes the opening up of the pasture by their habit of consistently chewing the succulent, tender, clover plants when they are endeavouring to establish and thicken up. The most suitable animals to use to prevent this destruction are young cattle, and full use should be made of these valuable animals to assist the young pastures to establish into a strong, thick sward. At Flock House Farm of Instruction young dairy heifers are brought on to the new pastures as weaners in late summer of each year and they are rotationally grazed lightly over the paddocks. Ewes then follow the young cattle, and they are also allowed to give the paddocks only a light grazing. During the first summer of a young pasture it should be grazed solely by young cattle; sheep should not be permitted to take up the grazing of these areas until autumn, winter, and spring, when the pastures will stand up to the close grazing sheep give them.

The work which has been done on this type of country has shown that many thousand acres of this scrub-covered sand country adjacent to the west coast of the North Island can be brought into productivity.

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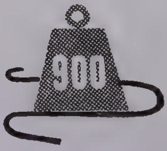

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Stacking Baled Hay

By J. R. MURRAY, Instructor in Agriculture, Department of Agriculture, Hamilton

THERE are various methods of building a stack of rectangular bales of hay so that each layer locks the preceding layer and thus forms a solid stack. A simple system that holds the stack firmly together is being used successfully in the Waikato, and once the basic layout of bales is understood no trouble should be experienced with it.

THE advisability of providing a special base for the stack is debatable, because any material such as hay placed on the ground for bales to rest on tends to detract from the essential firmness of the foundation layer of bales. Provided the site is level and free of water seepage, there is little danger of the hay being lost if bales are placed on their cut edges.

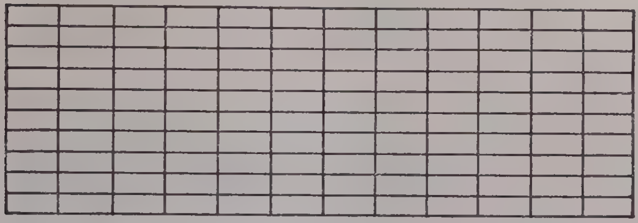

Fig. 1—First or base layer, cut edges down.

The succeeding steps are as follows, all layers of bales being laid flat with cut edges to the outside where possible:—

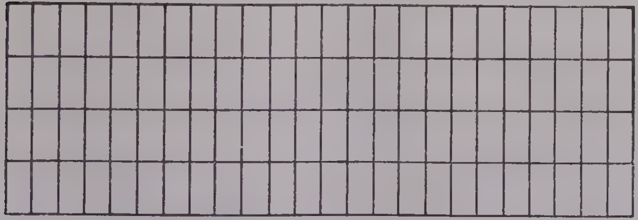

Fig. 2—Second, fourth, eighth, and tenth layers.

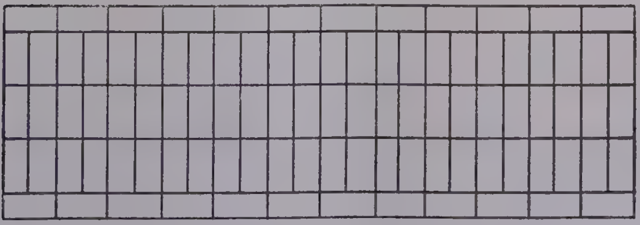

Fig. 3—Third and ninth layers.

Layers 5, 6, and 7 form the tie which locks the ends of the stack securely. Fig. 4 shows that the ends (A) are similar to layer 2 (Fig. 2), except that they are turned at right angles; the centre of layer 5 (B, Fig. 4) is the same as layer 3 (Fig. 3).

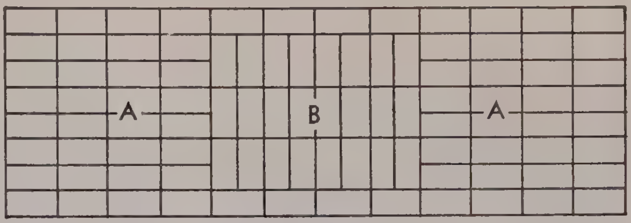

Fig. 4—Fifth and seventh layers.

Fig. 5 shows that the ends of the sixth layer (A) are similar to layer 3; the centre of layer 6 (B) is the same as layer 2.

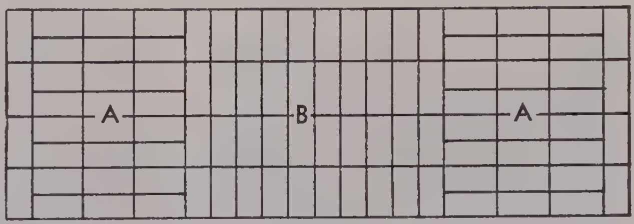

Fig. 5—Sixth layer.

The eave layer is placed on the eighth or tenth layer as shown in Fig. 6.

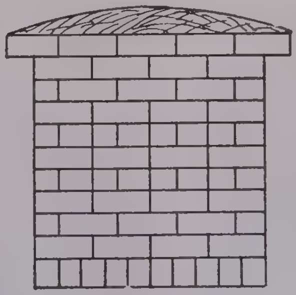

Fig. 6—End view.

The outside row does not extend much beyond the edge of the stack, because the top layer is tightly packed.

For stacks in the open, canvas covers have been successfully used, and although expensive, are well worth while, as no hay is lost. The stack should be crowned with loose hay before covering to provide the desired run-off. To form a crown of hay sufficient for a stack 12 bales long it will be necessary to cut and tease out 18 bales. The cover is tied down to loops of wire laid on top of the sixth layer as the stack is being built.

In a stack as shown in Fig. 7 there would be three large horizontal wire loops, each one overlapping the other by about 1ft. Each wire loop should be of sufficient length to permit tying and twitching tightly so as to encircle about one third of a stack of this size. An advantage is that no matter where the ropes of the cover come there is always a portion of a wire to tie them to.

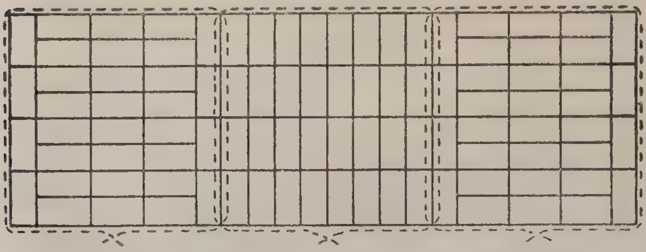

Fig. 7—Positions of wire loops (dotted lines) for tying cover.

Wires should not be tied when laid, but should be left until the weight of succeeding layers of bales exerts sufficient pressure to counteract the pull as they are tied.

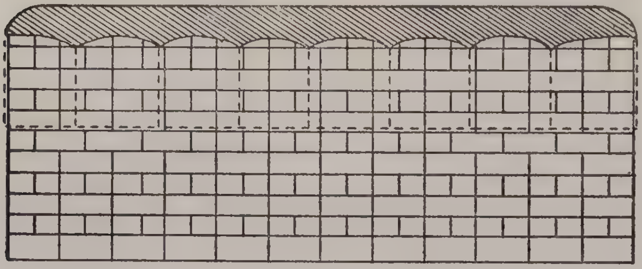

Fig. 8—Side view.

The side view of the stack is shown in the heading photograph and in Fig. 8, in which can be seen the canvas cover tied to the wire loops. When feeding out is to begin the end loop can be released and the cover thrown back from the end without affecting the cover over the rest of the stack.

Where hay alone is used as a cover any type of steep-pitched top can be arranged with the bales before placement of the hay. To cover a large stack (about 3000 bales) with hay about 2 acres of hay and a considerable amount of time and labour are required. Much of this hay is wasted at the completion of feeding out. With canvas covers about ⅓ to ½ acre of hay only is required, covering can be done in about 1 hour and with little labour, and there is no subsequent waste.

This method of stacking bales has been proved over a number of years to be particularly sound. For most purposes the stack 4 bales lengthwise wide is sufficient, but if a wider stack is needed, a fifth bale can be added without altering the basic plan. However, it is better to extend the stack lengthwise than to make it wider. The basic plan to follow is the placement of bales as shown in layers 2 and 3 and grouped according to the diagrams. The large stack is actually a square stack at each end with bales filled in between, with the second and third layers alternating. Once the bales have settled there is no danger of the middle portion falling when an end is removed for feeding out.

The following three main points should be noted:—

1. For the foundation layer place the cut edges down.
2. For all other layers build from the ends to the centre and from the sides to the centre.
3. Any gaps left must be in the centre.

Acknowledgment

Acknowledgment is made to Mr. Norris Peacocke, Hamilton, for his co-operation in working out this method of stacking.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to 28 March:—

February

2 February—Horowhenua Ram Fair at Levin.
4 February—Marton District A. and P. at Marton.
6 and 7 February—Ohura A., P., H., and I. Association at Nihoniho.
7 February—Rodney Agricultural Society at Warkworth.
7 February—Rangitikei A. and P. at Taihape.
7 February—Woodville A. and P. at Woodville.
7 February—Golden Bay A. and P. at Takaka.
7 February—Hukerenui A. and P. at Hukerenui.
*7 February—Clevedon A. and P. at Clevedon.
10 and 11 February—Dannevirke District A. and P. at Dannevirke.
13 February—Dannevirke Ram Fair at Dannevirke.
13 and 14 February—Taranaki Metropolitan A. and P. at New Plymouth.
*13 and 14 February—Taumarunui and District A. and P. at Taumarunui.
*13 and 14 February—Buller A. and P. at Westport.
14 February—Waitemata A. and P. at Waiwera.
14 February—Pahiatua A. and P. at Pahiatua.
14 February—Tauranga A. and P. at Tauranga.
18 February—Te Awamutu A., P., and H. at Te Awamutu.
20 and 21 February—Masterton A. and P. at Masterton.
20 and 21 February—Franklin A. and P. at Pukekohe.
*21 February—Murchison A. and P. at Murchison.
21 February—Northern Wairoa (Arapohue) A. and P. at Mititai.
21 February—Waiapu P. and I. at Ruatoria.
21 February—Banks Peninsula A. and P. at Little River.
21 February—Te Puke A. and P. at Te Puke.
24 February—Otorohanga A. and P. at Otorohanga.
25 February—Opotiki A. and P. at Opotiki.
26 February—Matamata A. and P. at Matamata.
*27 and 28 February—Wellington and Hutt Valley A. and P. at Upper Hutt.
28 February—Putaruru District A. and P. at Putaruru.
28 February—Waimarino A., P., H., and I. at Raetihi.
28 February—Whakatane and Rangitaiki A. and P. at Whakatane.
28 February—Maniototo A. and P. at Ranfurly.

March

*4 March—Morrinsville A. and P. at Morrinsville.
*6 and 7 March—Te Kuiti and District A. and P. at Te Kuiti.
7 March—Amuri A. and P. at Rotherham.
7 March—Waiotira A. and P. at Waiotira.
*7 March—Temuka and Geraldine A. and P. at Winchester.
7 March—Albany A. and P. at Albany.
7 March—Mt. Benger A. and P. at Roxburgh.
7 March—Mangonui County A. and P. at Kaitaia.
10 March—Lake County A. and P. at Arrowtown.
14 March—Waikato Central Agricultural Association at Cambridge.
*14 March—Kaikoura A. and P. at South Bay.
14 March—Hawkes Bay A. and P. Autumn Show at Hastings.
*14 March—Kumeu District A. and H. at Kumeu.
14 March—Upper Clutha A. and P. at Wanaka.
*21 March—Cheviot A. and P. at Cheviot.
21 March—Mayfield A. and P. at Mayfield.
23 March—Wellsford A. and P. at Wellsford.
28 March—Hawarden A. and P. at Hawarden.
28 March—Methven A. and P. at Methven.
28 March—Flaxbourne A. and P. at Ward.

* The Department of Agriculture exhibit will be staged at this show.

Pasture and Stock Management on Hill Country

BEFORE beginning extensive topdressing programmes hill-country farmers would be well advised to consider whether or not their farm management can be adjusted to make the best use of such topdressing. Points to be watched are the adequacy of subdivision of the property in relation to stock management, the supply of extra stock to cope with the extra feed that will be produced, and the present state of the pastures. If clovers are absent or if only low-producing annual species are present, consideration should be given to oversowing suitable species such as the better strains of white clover or subterranean clover.

To get the full value from topdressing, improvements in stock management will be required on most properties. Controlled grazing management is essential for maximum pasture production. For most farmers it will be better to start hill-country topdressing in a small way and make a job of it; give adequate fertiliser, control weed and scrub growth, and fence and oversow with clover seed if required. Far too often the topdressing of extensive areas without consideration of the matters that go hand in hand with topdressing has led to the wasting of valuable fertiliser or at least to the obtaining of only a small fraction of the possible benefits that can result from its use.

—*P. B. LYNCH, Crop Experimentalist,*
Department of Agriculture,
Wellington

Control of Diseases and Pests in Household Poultry

HOUSEHOLD poultry are susceptible to many common diseases and pests which could be better controlled if poultry keepers had more knowledge of symptoms and remedial treatments. In this, the second article of a series on diseases of household poultry, an officer of the Animal Industry Division of the Department of Agriculture describes various ailments and parasites and methods of prevention and control. A third and concluding article on control of diseases will appear in next month's "Journal of Agriculture".

THE general term "roup" is often used by poultry keepers to indicate a poultry disease a symptom of which is a purulent discharge at the eyes and nostrils, usually accompanied by swellings on the face. However, this condition may arise in a number of diseases, for example, fowl pox, and in cases of vitamin A deficiency, and roup therefore is a vague term which merely describes an obvious symptom common to a number of diseases and conditions.

Mild outbreaks of colds giving rise to slight nasal discharges are fairly common in poultry flocks. A symptom is frequently gulping or sniffling sounds, which are more easily noticed when the birds are perching. Sometimes only one or two birds are affected, and the condition does not appear to spread very rapidly.

Infectious Coryza (Roup or Cold)

Infectious coryza, which is very contagious, spreads rapidly among birds and may cause a number of deaths, severe and general loss of condition, and a drop in egg production.

The principal symptoms are a nasal discharge and an ocular discharge which tends to cause the eyelids to stick together, accompanied by swelling of the sinuses which become impacted with pus. The birds may be unable to see or eat, and may sit around in a drowsy condition.

Control

The condition is more prevalent during damp, cold weather, especially in autumn and early winter. Dampness, overcrowding, poor ventilation, lack of vitamin A, and worm infestation are commonly associated with it and help its development.

Immediately a bird exhibits signs of a discharge accompanied by sneezing or coughing it should be isolated from the other birds, on which a close watch should be kept.

Although some sulpha drugs have been found useful in treating this condition, results are often disappointing, and in general the household poultry keeper will obtain good results by isolating affected birds and providing comfortable and warm but well-ventilated quarters, free from draughts. Wet mash is suitable for sick birds, and an ample supply of good greenfeed should be provided. Antiseptics in the drinking water are of little value, and renewing the supply of fresh water frequently will give better results. Treatment of the affected parts is useful, but care must be taken to avoid spreading the disease after handling sick birds. Cleaning the eyes and nostrils with a solution of boric acid, hydrogen peroxide, or other mild antiseptic helps to relieve the affected bird. Eucalyptus oil or menthol and turpentine sprayed in the house at night or the application of a menthol ointment to the nostrils is also useful. If a fish liver oil is not being fed, it should be added to the diet as recommended by the manufacturer.

In some parts of the country, particularly in the Auckland area, coryza may be confused with fowl pox, another contagious disease, but with fowl pox thick, cheesy deposits in the mouth and nodules on the comb and wattles are distinguishing features.

Vitamin A Deficiency

If the household flock is fed on the standard type of laying mash, grain, and greenfeed as advocated in previous articles about household poultry, it is very improbable that there will be any deficiency of minerals or vitamins. Special mention, however, should be made of the importance of vitamin A to laying birds.

Reminders for February

New-season pullets now coming into lay should be receiving Laying Mash No. 1 or Laying Mash No. 2. If the No. 2 mash is used, 1lb. of meat meal should be added to every 10lb. of mash.

As a precaution against roundworms it is wise to dose pullets before they come into lay with carbon tetrachloride capsules, using 2 c.c. capsules for birds 16 weeks of age and over. Even a few worms in the intestines sap vitality.

In warm weather external parasites multiply and become a menace, particularly to young, developing pullets. A watch should be kept for lice and red mites.

Some laying birds hatched in 1951 may go into an early moult. Such birds are usually poor producers and will not be worth keeping for laying for a second year, and should be culled for the table.

This season's pullets should be put into a laying shed that has been thoroughly cleaned and disinfected. They require a good depth of clean litter.

Under no circumstances should this season's growing pullets be mixed with last year's laying birds. The older birds will bully the new pullets, keeping them away from the food trough.

Most owners of small flocks are aware of the necessity for greenfeed, but it should be pointed out that at certain periods of the year greenfeed may be of poor quality and fail to satisfy the need for vitamin A.

Deficiency of vitamin A leads to poor egg production, lack of resistance to disease, and, if severe enough, symptoms similar to coryza, that is, swelling of the sinuses and discharge from the eyes and nose. This is usually known as **nutritional roup.**

Where there is difficulty in supplying adequate greenfeed of good quality a vitamin A-rich fish oil should be added to the mash. Many people consider it advisable to use the fish oil during the whole season as a safeguard against deficiency of vitamin A.

The inclusion of a fish oil in the diet ensures that vitamin D requirements are fully met. Vitamin D is required by young pullets and laying birds to ensure proper assimilation of calcium, which they require for bone building and the formation of egg shells. Normally exposure to sunlight for a few hours daily is sufficient to enable the birds to synthesise their own requirements of this vitamin, but if they are kept intensively with no access to sunshine, it is necessary to supply vitamin D in the feed.

External Parasites

Lice

A number of different species of lice infest domestic poultry, the principal ones being the body louse, wing louse, and shaft louse. The body louse is the only one of much importance as a menace to health. Body lice are found directly on the skin, particularly round the vent. They live on the skin scales and the body secretions, causing irritation and the formation of small scabs in bad infestations. Infested birds may become unthrifty through the continual irritation.

Individual birds may be treated successfully with dusting powders containing 5 to 10 per cent. of D.D.T. or "Gammexane". A few drops of nicotine sulphate (40 per cent.) applied to the skin below the vent will rapidly destroy these pests, and the same preparation is also extremely useful if used as a paint and applied to the perches half an hour before perching time. It should be re-applied in 10 to 14 days to eliminate lice which have developed in that time from the hatching of the parasite eggs on the feathers. The fumes of the nicotine sulphate kill the parasites. Also available are perch paints containing "Lindane" and D.D.T. which have a more lasting effect owing to the residual action of these two insecticides.

Red Mite

Red mite frequently remains undetected in the poultry house until it becomes evident as the cause of poor, unthrifty condition in the flock.

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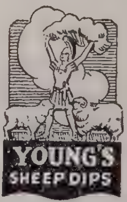

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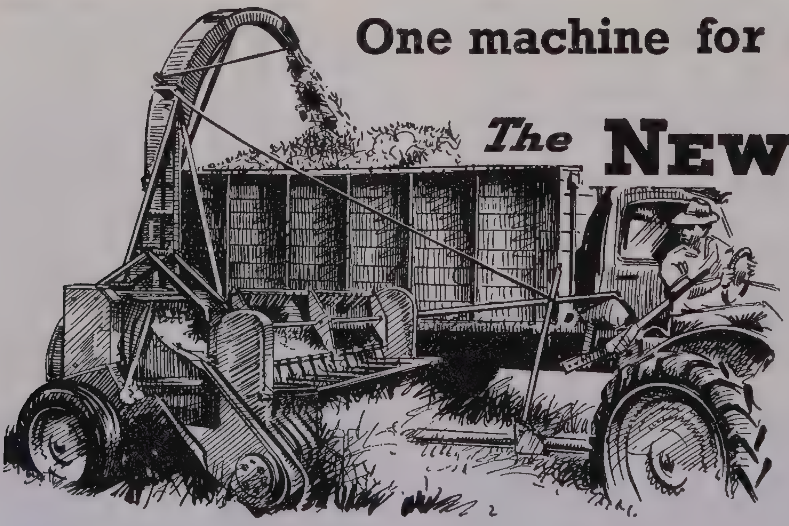

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The mites feed on the birds at night and hide away during the day in cracks or crevices in the walls, nests, perches, and floor. If present, they are usually easily detected at the ends of perches. The eggs are pearly white and the developing mites cast their skins several times, forming a silvery white powder, not unlike cigarette ash, which may be found underneath the perches. The unfed adult is light grey, but after feeding on the bird it is red.

Red mite is seldom troublesome in cold weather, but if the infestation is allowed to continue into the warmer season, it rapidly becomes serious.

Control: If infestation of the house is mild, the ends of the perches and any cracks in the boards should be treated with creosote or waste fuel oil. The addition of kerosene to the latter permits it to be sprayed and allows better penetration. A 5 per cent. solution of a coal tar disinfectant may also be very effective. Before any spraying or treatment it is advisable to clean out the house, as dust and dirt provide hiding places for the mites and protect them from the spray.

A suspension of 50 per cent. D.D.T. wettable powder sprayed on the walls, floor, and perches is very effective. The concentration of the spray should be 1 to 2 per cent. of D.D.T. Of course, this can only be used when the house is empty and clean.

Prevention: Houses with dark interiors encourage red mite infestation and hinder observation. Perches with overlapping ends provide good hiding places and are difficult to treat. All perches should be so constructed that they allow easy observation and do not provide hiding places for red mite.

Scaly Leg

Scaly leg is due to a mite which invades the skin under the leg scales. The complaint can be recognised by the enlarged and thickened appearance of the foot and shank of the leg. The disease is contagious and spreads slowly. Both legs are usually attacked at the same time. The continued irritation of the mites causes a thickening of the leg and ulceration of the scales. Birds may become lame and eventually the joints are badly affected.

Treatment: Simple treatments which can be very effective are:—

1. Softening the scales with a soft soap solution and then applying a 15 per cent. sulphur ointment, rubbing it well under the scales.

2. Dipping the affected foot and shank into a bucket containing fuel oil or a mixture of one part of kerosene and two parts of linseed oil. The material should be well rubbed in, but particular care must be taken not to allow the oil to touch the skin of the leg above the shank.

It may be necessary to apply treatment several times at weekly intervals.

The affected birds should be isolated and the perches treated with creosote or crude oil to kill any mites.

Common Disorders

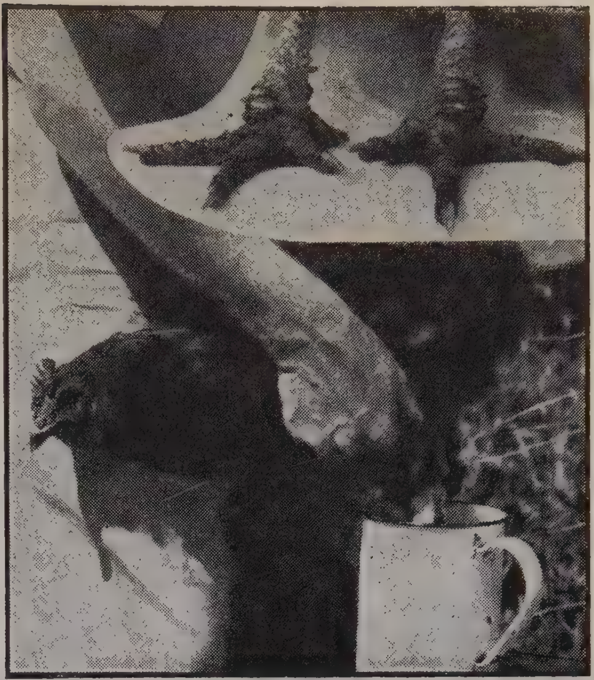
Other disorders occur fairly frequently in small flocks, and two which will respond to individual treatment are described here.

Impacted Crop (Crop Bound)

Impaction of the crop arises from over-distension of the walls of that organ owing to the consumption of fibrous material such as straw or coarse grass. Paralysis of the crop wall may also result from other forms of indigestion or from diseases such as fowl paralysis, pullet disease, or fowl cholera.

The distended crop is observed as a large, firmly packed swelling at the lower end of the neck.

Treatment: If the condition is not too advanced, a dose of two teaspoons of olive oil or liquid paraffin followed by massage of the crop area toward the head may relieve the condition sufficiently to allow recovery. Massaging is greatly assisted if the bird is held upside down.



[*Fraser Niederer photo.*

Method of dipping bird's legs for treatment of scaly leg. Inset—Legs of bird infested with scaly leg.

Operation on the crop can be successful if the first method is useless. The skin over the crop is incised with a sharp razor blade or knife after the feathers have been removed from the area. The skin incision should then be pulled to one side so that the incision in the crop is not immediately under the skin incision. The impacted contents may then be removed with a small spoon or forceps. The crop should then be washed out with cooled boiled water to which common salt has been added at the rate of a teaspoon to each pint.

The opening need not be more than 1in. long and the two incisions should be stitched separately. Three or four stitches of silk or cotton thread are used to close the crop, and the same for the skin wound.

A liquid diet should be fed for a few days, and then a soft mash.

Sour Crop

Sour crop is somewhat similar to impacted crop, but the contents of the crop are more fluid and therefore easily emptied out by upending the bird and massaging the crop. The bird should be given an occasional rest during the treatment. Emptying of the crop may be followed by dosing the bird with a quarter teaspoon of baking soda in warm water. The feed should consist of grains only for 2 or 3 days after treatment.

Feather Picking and Cannibalism

The term "cannibalism" is usually restricted to cases where birds attack each other or a few individuals in the pen and cause bleeding wounds. Both feather picking and cannibalism are regarded as vices which may arise from a number of causes, including close confinement, overcrowding, idleness and boredom, deficiencies in the diet, or the irritation caused by external parasites. One bird in the pen may start an outbreak of the vice.

Control

In a small flock it is often possible to pick out the offending bird at an early stage and prevent the progress of this vice. A check on the diet should be made to ensure that the flock is receiving sufficient protein, and if there is a doubt, a little meat meal may be placed in a separate container to allow the birds to help themselves. Other useful measures are:—

1. Hanging silver beet or other greenfeed from the roof for the birds to pick at.
2. The addition of whole oats to the grain ration. At least part of the grain should be fed in the litter to keep the birds occupied.
3. Increasing the salt content of the mash for **2 or 3 days.** On a mash-grain ration 4 per cent. of salt may be added to the mash.

If these measures are not successful, it may be necessary to trim the upper beak of the bird concerned with a sharp knife, removing about 3/16in. from the tip. The bird is then unable to peck at other fowls.

All wounds caused by pecking should be dressed as soon as possible with a dark ointment or tar, as other birds are attracted by the red colour of the wound.

Cookies that will Keep

Cookies that will Keep

THE very thing that housewives wish for when friends visit them unexpectedly, or during a holiday period, or when the day is busy and the tins are empty is baking that is ready. Of the recipes given in this article by Molly Macpherson, Field Officer in Rural Sociology, Department of Agriculture, Auckland, some are old favourites and some new, but all are for cookies which will keep fresh for some time. They can be decorated to have a festive air, ready for summer picnics or parties, and make a delightful gift. A tuck-box of cookies is always acceptable to children on their way back to boarding-school.

HINTS for making cookies are as follows:—

1. Where recipes require the cookies to be flattened this can be done by using a glass tumbler the base of which has been damped first, then dipped in sugar, and used to flatten the cookie on the oven slide, or the base of the glass tumbler can be covered with a clean cotton cloth which is wet and the cookies flattened on the oven slide with this.

2. If the dough which has to be rolled or moulded is too soft to allow this, set the mixture aside in a cool place until it hardens or chill it in a refrigerator until the dough is of a consistency easy to handle.

Old Favourites

Afghans

(Quantity, approximately 2½ dozen)

7oz. of butter
3oz. of sugar
6oz. of flour
1oz. of cocoa
Pinch of salt
2oz. of cornflakes

Cream the butter and the sugar together. Add the flour, cocoa, and salt sifted together, and mix well. Add the cornflakes and mix well. Put teaspoonfuls of the mixture on a greased oven slide and flatten. Bake in a moderate oven (350 degrees F.) for 15 minutes. When cool, ice with chocolate icing and decorate with a small piece of walnut.

Old-fashioned Brandy Snaps

(Quantity, approximately 2½ dozen)

6oz. of butter
6oz. of golden syrup
6oz. of sugar
2 teaspoons of ground ginger
6oz. of flour
½ teaspoon of lemon essence
½ teaspoon of vanilla essence

Put all the ingredients except the flour into a saucepan and allow to warm slightly until the butter is melted. Mix in the flour. Drop in small teaspoonfuls on a greased oven slide, leaving plenty of room to spread nine to each oven slide. When cooked allow to cool slightly on the slide, then roll round cream-horn shapes or handles of wooden spoons. Bake in a moderate oven (350 degrees F.) for 10 minutes. Before serving, fill with whipped cream.

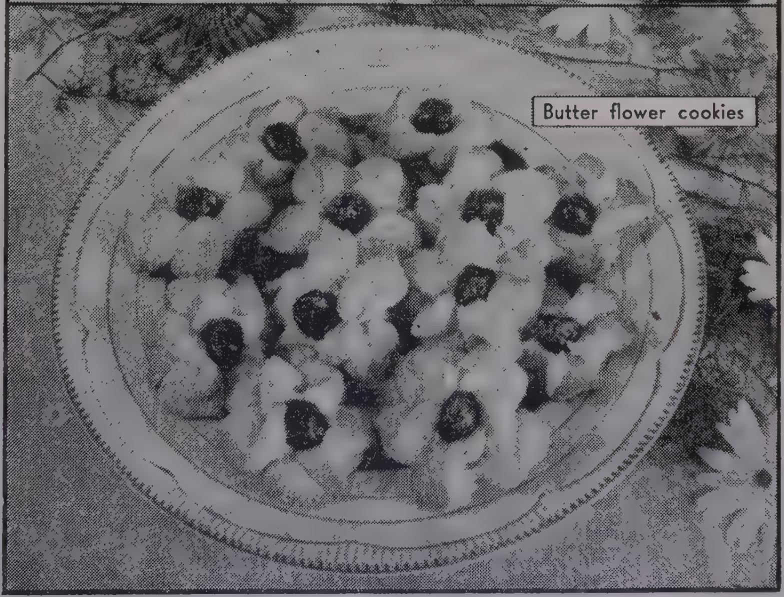
Butter Flower Cookies

(Quantity, approximately 3½ dozen)

6oz. of butter
12oz. of flour
4oz. of sugar
Pinch of salt
2 egg yolks
½ teaspoon of vanilla essence

Afghans

Brandy snaps


Butter flower cookies

Shrewsbury drops

Cream the butter. Add the flour, sugar, and salt sifted together, the egg yolks, and the essence. Beat the mixture until it is smooth and creamy. Use a pastry bag and a large rose nozzle to press the mixture out into flower shapes on to a greased oven slide, or roll the mixture into small round balls. Place a piece of crystallised cherry in the centre of each cookie. Bake in a hot oven (400 degrees F.) for 10 minutes.

Date Shortcakes

(Quantity, approximately 3 dozen)

4oz. of butter
2oz. of sugar
1 teaspoon of golden syrup
1 teaspoon of milk
6oz. of flour
1 teaspoon of baking powder
Pinch of salt

Cream the butter and sugar. Add the syrup and the milk and mix. Add the sifted dry ingredients and mix well. Take small pieces of the mixture and make into balls with a date inside or on top. Bake in a moderately hot oven (375 degrees F.) for 15 minutes.

Almond Shorties

(Quantity, approximately 2 dozen)

4oz. of butter
4oz. of sugar
6oz. of flour
1 teaspoon of baking powder
½ teaspoon of almond essence
1 egg or 3 tablespoons of milk

Cream the butter and sugar, add the egg, and beat until well blended. Add the essence and the sifted dry ingredients and mix well. Roll the mixture into one long roll 1½in. thick. Slice the roll into ¼in. pieces. Put half an almond on top of each piece and bake in a hot oven (400 degrees F.) for 10 minutes.

Shrewsbury Drops

(Quantity, approximately 2 dozen)

3oz. of butter
4oz. of sugar
1 whole egg
7oz. of flour
2 teaspoons of baking powder
1 dozen almonds peeled and halved
1 egg white (lightly beaten)
1 tablespoon of sugar
¾ teaspoon of cinnamon
Pinch of salt

Mix the butter, sugar, and whole egg until creamy. Sift the flour, baking powder, and salt together and mix into the butter mixture. Drop the mixture in teaspoonfuls on to a greased oven slide, flatten, and brush the tops with lightly beaten egg white. Mix 1 tablespoon of sugar and ¾ teaspoon of cinnamon together and sprinkle the tops of the cookies. Place half an almond in the centre of each. Bake in a moderately hot oven (375 degrees F.) for 12 minutes.

With Cocoa

Chocolate Date Drops

(Quantity, approximately 3 dozen)

4oz. of butter
6oz. of sugar
1 egg
12oz. of flour
½ cup of milk
2 tablespoons of cocoa
1 teaspoon of vanilla
¾ cup of chopped dates

Cream the butter, adding the sugar gradually. Add the egg and beat well. Add the sifted flour and cocoa alternately with the milk. Add the vanilla essence. Stir in the chopped dates sprinkled with flour. Drop in teaspoonfuls on a greased oven slide and bake in a moderate oven (350 degrees F.) for 15 minutes.

Date shortcakes

Coconut jumbles

Brown Walnut Fingers

(Quantity, approximately 2 dozen)

4oz. of butter
6oz. of sugar
8oz. of flour
2 teaspoons of cocoa
Pinch of salt
½ cup of chopped walnuts
1 egg

Cream the butter, sugar, and egg together. Add sifted flour, cocoa, and salt. Add the walnuts and mix well. Spread on to a greased oven slide. Bake in a moderate oven (350 degrees F.) for 20 minutes. Cut into fingers when cold.

With Chocolate

Chocolate Delights

(Quantity, approximately 2½ dozen)

2 tablespoons of sugar
2 tablespoons of sweetened condensed milk
Pinch of salt
4oz. of butter
6oz. of flour
2oz. of dark chocolate (cut into small pieces
1 teaspoon of baking powder

Cream the butter, sugar, and condensed milk together. Add the sifted flour, baking powder, and salt and mix. Lastly, add the pieces of dark chocolate and mix. Roll pieces of the mixture into balls and flatten. Bake in a moderate oven (350 degrees F.) for 20 minutes.

Chocolate Logs (No Baking)

(Quantity, approximately 2 dozen)

1 tin of sweetened condensed milk (8 fl. oz.)
2oz. of dark chocolate
½lb. of broken biscuits
½ cup of sultanas or fruit

Melt the chocolate with the condensed milk in a double boiler. Pour over crumbed biscuits. Add the sultanas and mix well. Flatten in tin to ½in. thickness. When set ice with thin chocolate icing and cut into fingers.

With Coconut

Coconut Jumbles

(Quantity, approximately 2 dozen)

4oz. of butter
4oz. of sugar
1 beaten egg
6oz. of flour
½ teaspoon of vanilla
Pinch of salt
½ cup of coconut

Cream the butter and sugar together. Mix in the egg and vanilla essence. Add the flour (sifted), salt, and coconut. Press to ½in. thickness into a greased tin. Bake in a moderate oven (350 degrees F.) for 20 minutes. Cool, and ice with thin chocolate icing. Sprinkle the icing with coconut. When the icing is set cut into fingers.

McGinty cookies

Coconut Crisps

(Quantity, approximately 3 dozen)

1 heaped cup of coconut
12oz. of flour
6oz. of sugar
½ teaspoon of soda
1 teaspoon of cream of tartar
1 egg

Mix all ingredients thoroughly together. Drop in teaspoonfuls on a greased oven slide. Bake in a moderate oven (350 degrees F.) for 20 minutes.

With Rolled Oats

Chinese Chews

(Quantity, approximately 2½ dozen)

2 eggs
1 cup of brown sugar
3oz. of melted butter
1 teaspoon of vanilla essence
Pinch of salt
1 cup of flour
½ cup of seedless raisins
1 teaspoon of baking powder
¾ cup of chopped dates
¾ cup of chopped walnuts
¼ cup of lemon peel
½ cup of rolled oats

Beat the eggs and sugar together. Add the melted butter and vanilla. Pour this mixture into the sifted dry ingredients and rolled oats. Add the fruit and mix. Bake in a baking dish in a moderately hot oven (375 degrees F.) for 30 to 40 minutes. Cut while hot.

Crunchy fruit drops

Nutties

(Quantity, approximately 2 dozen)

7oz. of rolled oats
4oz. of butter
4oz. of brown sugar
2oz. of chopped nuts
½ teaspoon of salt
½ teaspoon of vanilla
1 tablespoon of golden syrup

Melt the butter and add the other ingredients. Mix thoroughly and press into a greased baking dish. Bake in a moderately slow oven (325 degrees F.) for ½ hour. Cut into fingers when almost cold.

With Fruit

McGinty Cookies

(Quantity, approximately 2½ dozen)

3oz. of butter
6oz. of brown sugar
1 egg (beaten)
6oz. of flour
½ cup of seedless raisins
½ teaspoon of baking powder
½ teaspoon of baking soda
2 tablespoons of milk
¾ teaspoon of salt

Cream the butter and sugar together. Add the egg. and beat well Add the sifted dry ingredients alternately with the milk, mixing after each addition. Stir in the raisins. Drop the mixture in teaspoonfuls on to a greased oven slide. Bake in a moderate oven (325 degrees F.) for 20 minutes.

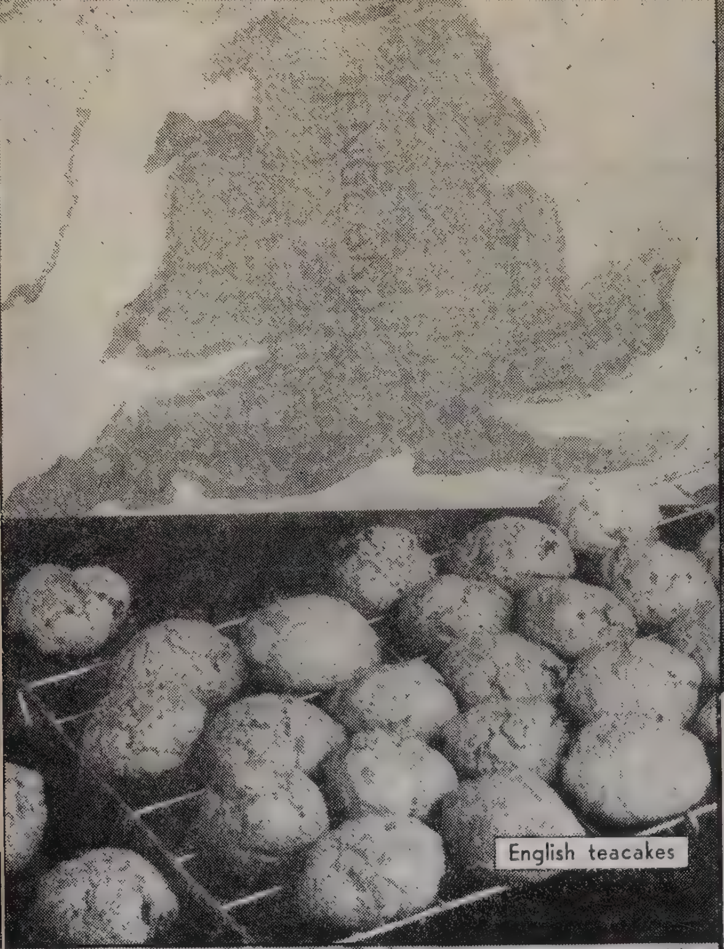
With Nuts

Nut Butter Balls

(Quantity, approximately 4 dozen)

8oz. of butter
8oz. of sugar
½ teaspoon salt
12oz of flour
1 teaspoon of almond (or other) essence
1½ cups of finely chopped nuts

Cream the butter and sugar. Add the remainder of the ingredients and mix well. Drop in small teaspoonfuls on ungreased oven slide. Bake in a



English teacakes

Mexican wedding cakes

Swedish nut fingers

moderate oven (350 degrees F.) for 15 minutes. After baking and while still warm roll nut butter balls in sugar or icing sugar.

Crunchy Fruit Drops

(Quantity, approximately 3½ dozen)

3oz. of butter
6oz. of brown sugar
1 egg (well beaten)
12oz. of flour
½ teaspoon of cinnamon
½ teaspoon of ground cloves
1 teaspoon of baking soda
1 cup of chopped nuts
½ teaspoon of salt
1 cup of seedless raisins
½ cup of sour milk or buttermilk

Cream the butter and the sugar. Add the beaten egg and beat well. Sift the flour, salt, cinnamon, cloves, and baking soda together. Add the nuts and raisins to the flour mixture and add all to the butter mixture alternately with the sour milk, mixing in between each addition. Drop the mixture in teaspoonfuls on to a greased oven slide. Each cookie may be decorated with a piece of crystallised cherry or half almond. Bake in a moderately hot oven (375 degrees F.) for 20 minutes.

From other Lands

English Teacakes

(Quantity, approximately 3 dozen)

3oz. of butter
6oz. of sugar
1 whole egg
3 tablespoons of milk
⅓ cup of lemon peel
10oz. of flour
1½ teaspoons of baking powder
½ cup of currants
Pinch of salt
1 egg white lightly beaten

Cream the butter, sugar, and 1 egg together. Add the milk, fruit, and sifted dry ingredients and mix well. Roll dough into small balls; dip the tops into the lightly beaten egg white and then into sugar. Place them sugared sides up on a greased oven slide. Bake in a hot oven (400 degrees F.) for 15 minutes.

Mexican Wedding Cakes

(Quantity, approximately 3 dozen)

6oz. of butter
1 teaspoon of vanilla essence
Pinch of salt
1 cup of chopped walnuts
12oz. of flour
6 tablespoons of icing sugar

Cream the butter and add the vanilla. Stir in the flour, salt, and walnuts, and mix well. Roll pieces of the mixture into small balls and place on an ungreased oven slide. Bake in a hot oven (400 degrees F.) for 10 minutes. Roll them in the icing sugar while they are still warm. Store overnight before serving.

Swedish Nut Fingers

(Quantity, approximately 3 dozen)

5oz. of sugar
1 egg
2 tablespoons of milk
1 teaspoon of vanilla essence
1½oz. of butter
8oz. of flour
1 teaspoon of baking powder
2 teaspoons of salt
½ cup of chopped nuts
¼ cup of sugar

Cream the butter and 5oz. of sugar together. Add the egg, milk, and vanilla, and mix. Mix in the sifted flour, baking powder, and salt. Divide the dough into two pieces and spread each piece very thinly on a greased oven slide. Finish the spreading with a floured rolling pin. Combine ½ cup of chopped nuts and ¼ cup of sugar and sprinkle over the thin sheets of dough. Bake one slide at a time in a moderate oven (325 degrees F.) for 12 minutes. Cut into fingers while hot. These are delightfully salty.

All photographs by Sparrow Industrial Pictures Ltd.

HEADING PHOTOGRAPH: A rocky outcrop has been used to good effect in this attractive suburban garden in Auckland. An informal design has been used with advantage to relieve the straight line of the house. Sparrow Industrial Pictures Ltd. photo.

Autumn-flowering Annuals

THE raising of annuals and bedding plants for the home garden was discussed in the October 1952 issue of the "Journal". In this month's article for the flower gardener C. K. Ellis, formerly Horticulturist, Department of Agriculture, Dunedin, discusses autumn-flowering annuals and design in the annual beds and borders.

IN most gardens the site for autumn-flowering annuals selects itself, possibly because in the average garden only one suitable site is obtainable. The ideal site is probably a strip of ground, preferably not symmetrical, the soil of which is a good loam and which is not shaded by trees or fences and is open to sun and air. It should face north, north-east, or north-west. In most parts of New Zealand it is difficult to grow annuals to perfection on southern slopes.

The Soil

Almost any good garden soil will support a pleasing display of annuals. It must, of course, be supplied with adequate manures and fertilisers before each annual crop is planted. Spent hops are valuable in improving the soil for annuals, and seaweed, over the past few years, has become increasingly popular for the same purpose. Its manurial value is not very high, but its effect on the mechanical condition of the soil is fairly great and the quantities applied more or less compensate for its low nutritive content. Each year or before each group is planted a balanced complete garden fertiliser should be dressed over the surface and lightly forked in.

Many gardeners prefer to grow their annual plants in patches here and there among the perennials or shrubs, but no part of a garden can be more showy than that part devoted entirely to the growing of annuals.

When seeds for a spring display in such a bed are being bought care should be taken to ascertain that the plants are of the type which will mature and flower between January and March. This information is usually given on the packet. To make the task of laying out the border or bed easier it is advisable to sort the packets of seeds into groups according to their heights when fully grown so that the planting positions of each type may be planned well in advance. The dwarf species, of course, should be selected to fill the front parts of the layout and the taller types should naturally be placed at the back. There are many more dwarf annuals available at present than tall ones and this makes it difficult for the gardener to plan a bed of considerable width. For instance, where the border is more than 8ft. wide a number of tall-growing varieties must be selected; otherwise the depth of the border will be lost because all the flowers will be more or less in the one plane. In such cases it is advisable to use the few tall varieties in groups as large as possible and as a further insurance to make one or two close sowings of the seed of these types to reduce the risk of being left without plants should the first sowing fail.

Large groups should always be used where the border is broad, because planting in small groups tends to create a patchiness which is not pleasing. On the other hand where beds or borders are small or narrow small groups of the various types can be used with good effect.

The tendency to create straight lines between the types should be avoided, for with quick-growing plants, such as the annuals, lines dividing various types rapidly become irregular and the result is an untidy appearance of the bed. Gardeners with artistic leanings will have no difficulty in sketching out irregular plots to suit the situation, but for those who are not so gifted a good plan is to work from a small circle and, using this as a basic plot, to increase the plots to the sizes desired by adding extra circles. In this manner a rough design can be worked out easily.

Colour contrasts must also be considered, more so than in any other phase of gardening, because annuals are grown to provide a brilliant display of colour over an entire bed at one time.

Raising the plants from seed to planting out stage was fully discussed in the article "Raising Bedding Plants in Flower Garden" in the October 1952 issue of the "Journal".

Planting out

After the soil is prepared for planting out and worked down to a fine tilth the design of the border should be

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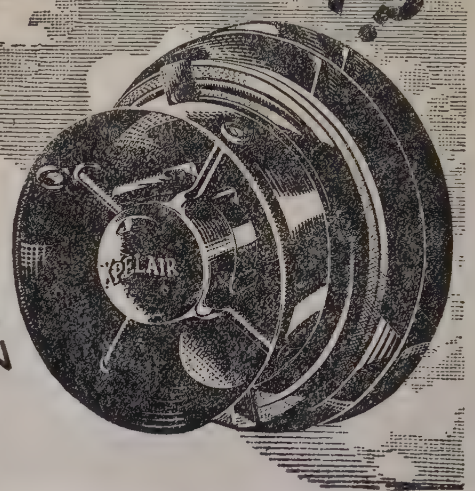

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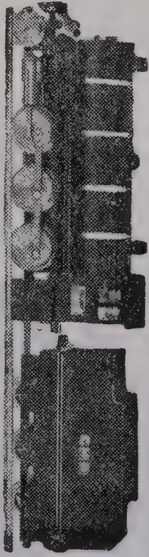

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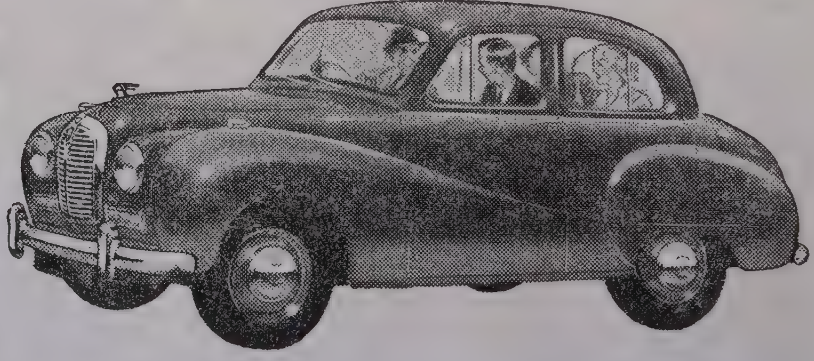

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marked out on the surface. It is not a waste of time to do this; rather it would have been a waste of time planning if this phase of the growing of annuals was not carried out.

It is a good plan also before planting to put a label bearing the name of each type on each plot. This not only eliminates the possibility of planting in the wrong spaces, but also serves as a reminder to the gardener of the names of any plants that he has not previously grown and of those which he does not particularly like and wishes to eliminate from his beds the next season. It also helps him if he wishes to save the seeds from any particular type of plant after flowering has ceased and the plants have become less easily recognisable.

The method of planting out is not one which requires explanation, as it is simple and straightforward. It is necessary, however, to emphasise that the gardener should adhere strictly to any recommendations regarding the spaces to be allowed between plants of the various types. Overcrowding or under-planting in an annual border does much to spoil the ultimate effect.

Garden Work for February

Annuals of many kinds, sown now in the cooler districts, will winter as small plants and make a worthwhile display in spring.

Ashes of various sorts rapidly accumulate in most households and have to be disposed of. Wood ashes are a valuable source of plant foods, especially potash, and where wood is the main fuel used for domestic heating the ashes should never be put in the dustbin or wasted. Instead, they should be stored in a dry place and applied to the soil whenever it is dug over; put day by day on some part of the garden not carrying a crop, and allowed to wash into the soil; or, best of all, put on the compost heap each day. The lime in the ashes will benefit the compost and the plant foods will be returned to the soil when dressings of compost are put on the garden. Wood ashes should not be allowed to accumulate in some odd corner open to the weather, as rain will dissolve and wash out most of the valuable ingredients, which will then be wasted.

[*Douglas Elliott photo.*

Colour contrasts attract the eye and can be used to brighten holdings too small to allow effective informal layout of shrub beds.

Coal ashes, on the other hand, should never be used in the garden. They contain practically no plant foods, but may contain enough boron to cause damage to plants. Though boron is an essential plant food, it is required in only very small amounts and regular dressings of coal ashes could possibly build up the boron in the soil to a dangerous level. The dustbin is the best place for coal ashes.

[*Douglas Elliott photo.*

Freesias make excellent winter pot plants. Bulbs planted in December will flower in July and August of the following year.

Bowls of bulbs in flower in the house in spring always make a welcome addition to the display of pot plants and offer a reminder of the bulbs which will be flowering in the border a little later on. Specially prepared bulb fibre, sold by seedsmen, should be used when bulbs are put in bowls which have no drainage holes, as soil goes sour under such conditions, but bulbs can also be grown well in ordinary plant pots, using a good potting soil. Lachenalias, freesias, and the small bulbs in general will grow much better in soil than in fibre. After potting stand the bowls or pots or sink them in the soil to the rims in the coolest, shadiest place available for about 6 weeks, watering them from time to time and never letting the soil dry out. It is a good plan to cover the pots with old sacks or a few inches of sand or old, fine cinders, as this top layer helps to keep the pots cool and reduces drying out to a minimum, and the added weight prevents the bulbs from lifting out of the soil as the roots grow. All the flowers in a bowl are rarely at their best at the same time, but this can be overcome by planting all the bulbs about 3in. apart in boxes, growing them in the usual way, and then digging them out and potting them up into bowls when the flower buds are showing clearly, matching the plants chosen for each bowl. Surprisingly, the bulbs do not seem to suffer from being transplanted in this way while in full growth, but they should be dug out of the boxes carefully and with as many roots as possible.

Bulbs for spring flowering as a rule should be planted as early as possible.

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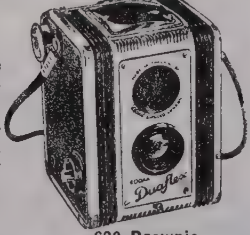

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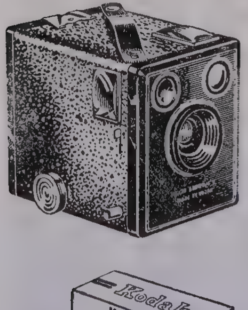

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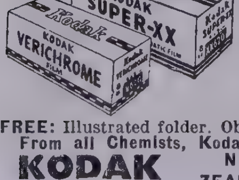

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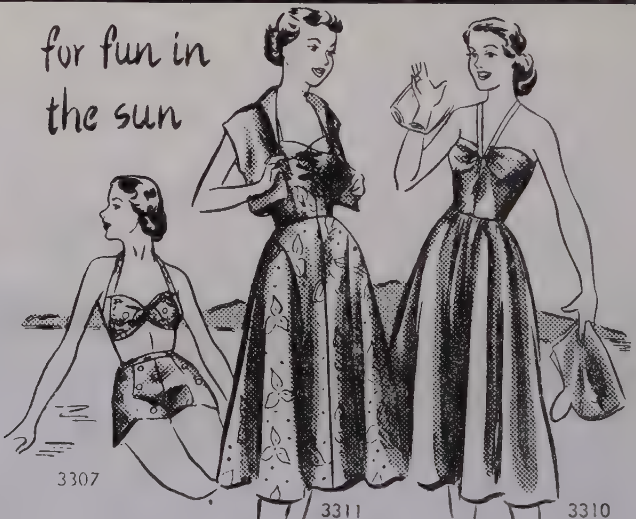

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Early planting does not necessarily mean earlier flowering, as the varieties flower in roughly the same order and at about the same dates each season, whether planted early or late. Earliness of planting affects the size and quality of the blooms, as the earlier-planted bulbs will develop a larger root system more capable of producing large flowers and leaves than those planted later. A succession of flowers should be ensured by planting a range of varieties and not by planting one variety at intervals. Apart from the always-popular tulips, narcissi, hyacinths, freesias, and lachenalias (the last two will not stand very heavy frost), ixias and Dutch iris should also be more widely planted to extend the bulb season into early summer. *Freesia burtoni*, a great improvement on the older types, has fragrant, large flowers of beautiful form and texture. It cannot be raised true to name from seed.

Chrysanthemum disbudding is the removal of unwanted flower buds, usually the smaller ones, when they are not larger than about pea size by pushing them gently sideways until they drop off. The operation results in larger flowers, as the removal of some of the buds gives a better supply of food for those that remain. On the other hand, heavy thinning of buds tends to shorten the total flowering period of any plant, as there will be fewer flowers still to open after the first ones fade. Little disbudding need be done on chrysanthemums grown for garden display unless particularly fine individual blooms are wanted, when the central bud should be left on. Some single varieties are best partly disbudded by having all but the top three or four buds on each stem removed, but many gardeners take the easy way and grow chrysanthemums as "sprays" (that is, with no flower buds removed), each stem bearing a succession of flowers, though these lack the size and substance of blooms from disbudded plants.

Cuttings of shrubs and many other plants put into a frame last month to root should be looked over regularly and sprayed with water daily to reduce wilting until the plants have developed roots. Cuttings usually perk up and the leaves become fresh and crisp ("turgid") before the new roots grow. The first sign that the cuttings have formed new roots will be when fresh green leaves start to develop in the centres of the plants. When the cuttings have rooted the frame light should be left off and the young plants allowed to grow naturally until they can be planted out into an odd corner of the garden to grow on or straight into their permanent places. The sooner they are planted out the better, but it is often wise to delay until autumn rather than plant in the drier summer weather, when each plant may need watering several times to keep it alive. There is a lot of truth in the old saying, "Plant when it is wet and sow when it is dry".

Everlasting flowers, though not very fashionable now, can be useful for decorating the home in the off-season, especially in hilly inland districts where borders go "dead" in winter and where there is no local shop to provide out-of-season flowers. Statice, helichrysums, helipterum, and acroclinium all have flowers with hard scaly petals that retain their colours when dry. They can all be grown as annuals by sowing seed in boxes in spring, growing the plants in boxes in a frame, and then planting them out in October or November, or by sowing the seeds outdoors in spring. The flowers should be cut when about half open, with the longest possible stems, tied in bunches, and hung upside down in a shed out of the sun and dust. The plants are left in this position until the stems have dried and stiffened so that the flower heads will not flop over when later they are arranged in vases, in which no water should be used. As soon as the stems are quite dry and stiff store the bunches in a cardboard box until they are required. Honesty can also be used, the plant being left untouched until the pods have ripened, as the silver "moons" for which the plant is grown are the central parts of the ripe seed boxes. Even larkspur flowers can be used by cutting the stems when the flowers are fully developed and drying them as described. The petals shrivel somewhat, but retain much of their colour. Though everlasting flowers can be kept for years, it is best to grow a new lot each season and to throw away the old ones when the spring flowers come in, as they are usually full of dust by that time.

[Green and Hahn Photography Ltd. photo.

Primula obconica makes an ideal house plant. Seed should be sown in the first week in December and flowers may be expected in August.

Gladioli may now be ready to lift in the northern, warmer districts, but elsewhere are at their prime. The best time to lift them is about 6 weeks after the flowers have faded, and the best methods are to spread the entire plants out in shallow boxes or trays until the foliage has died down completely, or to hang them up in bunches in a dry, airy shed. The stems and leaves should not be cut off until they have died down and returned to the corm all the food materials which they contained when lifted.

Hedges of evergreen species should be given their last clipping before winter. They should then be re-clothed with short new shoots before growth ceases and will look neat and tidy throughout winter. The secret of keeping hedges of reasonable size and pleasing appearance is to trim them often but lightly, as heavy cutting makes them unsightly and may spoil coniferous hedges altogether by leaving bare places which never grow again.

Hoeing is still very necessary, even though there may be few weeds to kill after the hot, dry summer weather—good weedkilling weather market gardeners call it. A danger at this time of year is that the surface may become baked and hard and then rain is likely to run off the surface instead of soaking immediately into the soil. Gardeners cannot afford to waste rain which falls in late summer. Another danger is deep cracking which occurs in prolonged dry spells, causing accelerated drying out of the soil and much damage to root systems. Regular hoeing between the plants, especially a few hours after each rainfall, will do much to avoid both these dangers.

Loam, the main ingredient of all seed-sowing and potting composts, should be stacked and allowed to rot before being used. Gardeners who intend to raise their own seedlings and pot plants will need loam next spring, and a supply of turves should be got in and stacked to rot. Early summer is the best time of year to dig turves for this purpose, as the soil and grass are still moist, but if the turves are collected now and are dry, they should be thoroughly damped as the stack is built.

Marguerites, especially the double white and the pink forms, are useful winter-flowering plants for all the milder districts, but are in disfavour because they soon look shabby if not properly attended to. In addition to having flower heads removed regularly marguerites should either be raised afresh each year from cuttings (which root very readily) or the bushes should be cut down hard in late summer to encourage new shoots to grow and flower through winter. Under this treatment marguerites will repay the attention given to them. They are also useful as cut flowers, but are much easier to arrange gracefully if cut with long stems and if most of the leaves are stripped off before they are put in vases.

Oxalis leaves will now be reappearing as the bulbs start to grow after their short summer rest. The only hope of controlling this weed is to carry out a relentless war against it. A leaf should never be left above ground longer than a day or two, and any bulbs seen when the ground is cultivated should be picked out and burnt. Late summer is a good time to start an all-out campaign against this weed.

Pot marigolds (calendulas) sown in boxes now, pricked out into other boxes when large enough to handle, and later planted out in a vacant space in the flower borders or shrubberies will provide a brilliant display of colour from mid-winter onward in all but the coldest districts. Winter-blooming marigolds seem to have larger blooms and more vivid colours than those grown in summer.

Schizanthus (poor man's orchid), antirrhinums, pot marigolds, cinerarias, and many other plants can usually be found growing in the beds at this time, especially under plants where the hoe has not disturbed the ground (and however diligent the gardener may have been in picking off faded flower heads occasional heads are left to ripen and shed their seeds). Self-sown seedlings can be watered, lifted carefully, pricked out into boxes, and grown on into good plants for setting out later in autumn.

Others Tasks for the Month

Plant anemones and ranunculuses for early flowers.

Continue to layer border carnations and take cuttings of pinks and perpetual flowering carnations.

Cuttings of such plants as lavender, catmint, verbena, and geraniums can be struck.

Cyclamen corms that were dried off in early summer and rested should now be shaken out, repotted, and started into growth.

Root a few cuttings of choice fuchsias in 3in. pots to make flowering plants for the windows next season.

Sow seeds of Iceland poppies in boxes kept in a shaded place until the seedlings show.

Common Troubles

Caterpillars of all sorts are likely to be troublesome in late summer, often defoliating cinerarias and playing havoc with geraniums and many other flowering plants. It is characteristic of caterpillar attacks that they come in waves. For months there may be relatively few caterpillars and then the gardener may quite suddenly find hundreds, which often do much damage before steps are taken to control them. Every gardener should train himself to notice tiny holes in the leaves of plants, as these usually indicate that a new generation of caterpillars has just been hatched. An immediate application of derris or D.D.T. dust with a hand duster or of an arsenical spray should stop attacks and prevent disfiguring damage. For flowering plants lead arsenate is best used at the rate of 1¼oz. in 4 gallons of water to which 2½oz. of hydrated lime should be added to reduce the risk of the lead arsenate causing leaf scorch, especially when it is applied to young and tender foliage.

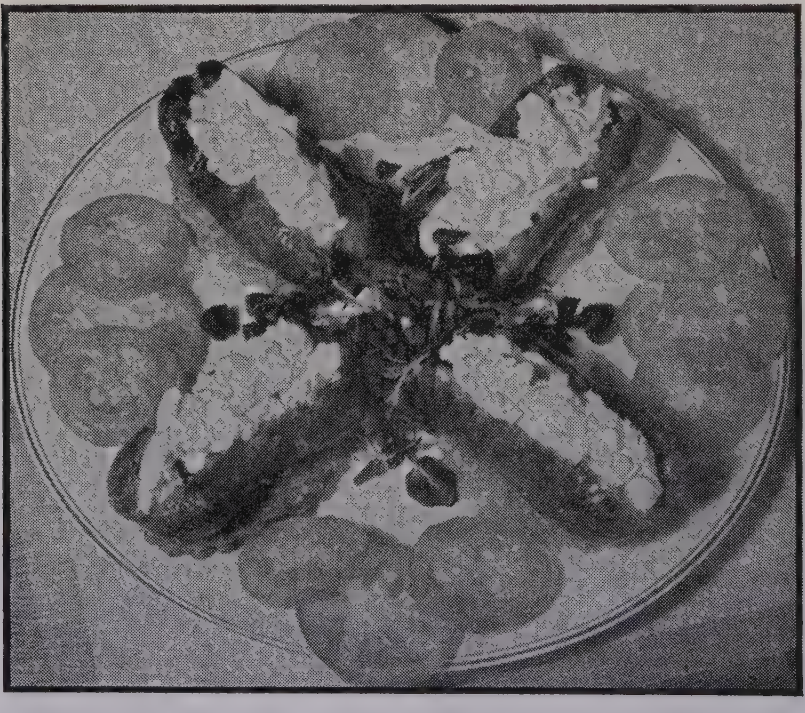
Lead arsenate does not dissolve in water and remains in proper suspension for only a short time. When drawing it from a bucket with a garden syringe it is important to keep the liquid well stirred. As the chemical is a stomach poison, it must be applied systematically over the plants to make sure that all the foliage is covered. If the application is patchy, much unsightly damage can still be done by the caterpillars before they eat enough of the lead arsenate to kill them. In fact some even seem to be able to eat round the poisoned patches.

Grass-grubs are the larvae of a brown beetle that flies at night in early summer. The grubs, which are cream with brown heads, can be recognised at once from all other soil creatures by the fact that when seen they are always lying curled up in a half circle. They are voracious feeders, eating the roots of grass and many other plants, including small fruits and flowers. Though grass-grubs do serious damage to the roots of flowering plants, they rarely kill them, and often the poor growth of the flowers is not connected with grass-grub attack, but is put down to some other cause. Often, in consequence, no steps are taken to eradicate grass-grubs from the flower borders.

The most obvious damage caused by grass-grubs is to lawns, where large areas of grass may die out in late summer as a result of the depredations of this pest. Nothing can be done to save the lawn at this stage, as the grass is already dead and all that remains is to sow more seed, but lawns can be safeguarded against grass-grub attack by dressing them with lead arsenate. This is most effective if used at the rate of ¾oz. to the square yard mixed with twice its own volume of sand, evenly spread, and well watered in. The lawn should also be rolled to press the grass plants back into contact with the soil and help them to reroot. This treatment, which should be done in early summer, is usually very effective, as most of the young grubs are poisoned by the lead arsenate. The greatest care should be taken when using lead arsenate, as it is poisonous to human beings.

When laying down a new lawn it is always worth while to incorporate 1½lb. of 50 per cent. wettable D.D.T. powder in 61lb. of fertiliser, dry sand, or soil, applied at 1oz. to the square yard, or 1½oz. of lead arsenate to the square yard with the top inch of soil before sowing to proof the lawn against grass-grub attack for 3 to 4 years, after which the dressing recommended should be applied each year.

Sausages and Scrambled Eggs



A GOOD main dish is sausages and scrambled eggs. The ingredients are 1lb. of sausages, 1oz. of butter, salt, pepper, watercress or parsley, 5 eggs, 5 dessert-spoons of milk, ½lb. of tomatoes, and 1 slice of fried bread or buttered toast for each sausage

Grill, bake, or fry the sausages. Melt the butter, add salt and pepper, then the eggs and milk beaten together. Stir the mixture over a gentle heat until the eggs are cooked. Split the sausages lengthwise and put them, filled with scrambled eggs, on the fried bread. Serve the dish with grilled or fried tomatoes.

"Bear Ye One Another's Burdens"

New School for Intellectually Handicapped Children Opened in Wellington

By Enid B. V. Phillips

ON 25 October 1949, 22 people met together in Wellington in an endeavour to help the intellectually handicapped children of this country. From the seemingly insignificant seed of that small beginning has grown the sturdy vine of the Intellectually Handicapped Children's Parents' Association, with its 15 branches and increasing membership well into its second thousand. To achieve such signal growth, however, the soil must be suitably prepared beforehand and the weeds of ignorance and indifference uprooted, and the credit for much of the preliminary spadework must be given to that couple with "green fingers" Mr. and Mrs. H. S. Anyon, one of whose hobbies appropriately enough is cultivating orchids.

MRS. ANYON was honorary secretary of the New Zealand association until 18 months ago, when the rapidly developing work of the organisation necessitated the services of a business secretary (the only paid official of the association). A New Zealand committee was elected and the Wellington committee, which had hitherto acted as a national committee, retired to branch status, and Mrs. Anyon still acts as honorary secretary to this branch, of which her husband is president.

Fulfilment of a Dream

For these two pioneers and the many parents who banded together in the common cause the opening of the Wellington Education Board's new school and occupation centre for intellectually handicapped children in Wellington is the fulfilment of a dream. The first specially designed centre in the Dominion and the forerunner of schools of its type, this school set on a sunny hillside in Coromandel Street is symbolic of a new era in education work and is the equivalent of any centre of its size overseas.

The Wellington Rose Society and the Assistant Director of Parks and Reserves arranged the planting of the roses and seedlings in the flower borders, and the Commercial Travellers' and Warehousemen's Association's generous gift enabled the provision of the playground equipment. The clearing of the lower area was done entirely by volunteer labour. Trees were moved, lawns levelled and sown, and an overgrown gully was transformed into a landscaped playground through the strenuous activities of the parents Saturday after Saturday. The parents, too, built the two picturesque summerhouses and paved the paths that wind down through the trees to where the grass slopes now form a natural amphitheatre, where a tall bluegum extends a convenient branch from which to suspend a rope swing, and where a long, curving slide with the ladder framed in a festive red and green stand reminiscent of a sideshow booth delights young and old alike.

The school basement is fitted up as a crafts room and overlooks a paddling pool and sandpits with shining aluminium lids, and in the centre of the sun terrace, where the geranium-bordered window-seats are wide enough to accommodate toys or work materials, is a miniature merry-go-round with scarlet chairs.

Harmony of Colour, Space, and Light

Such harmony of colour, space, and light prevails within the building that it seems as if Spring herself had strayed indoors. The lobby is hydrangea blue with a primrose ceiling and the main classroom has small cloud-white panels inset in the azure ceiling. Half the west wall is mimosa yellow, the rest being patterned in large squares the pale grey and coral hues of sunset; the north wall is composed almost wholly of windows, the white-painted sills holding bright-flowering cyclamen in pots.

Association's Address

The general secretary of the Intellectually Handicapped Children's Parents' Association (Inc.) may be communicated with at P.O. Box 2380, Wellington.

The domestic training room, adjoining the blue and primrose kitchen, has an entire wall of a new, crinkly wallboard the colour of peach bloom. Even the radio-gramaphone is leaf green and in the crafts bay beyond, with its forget-me-not-blue walls and blossom-pink ceiling, there repose a silvery graf zeppelin, a pile of paint-spattered easels, and a futuristic-looking rocking horse fashioned from steel and enamelled scarlet even to its stirrups. But perhaps the most delightful touch of all is to be found in the apple-green cloakroom. Here the cubby-holes for shoes are painted the deep rose-red of Maori carvings and above each coat-hanger is a nameplate of polished plywood ornamented with a gay little motif of flowers, flags, birds, or animals, the loving work of Mr. Anyon.

Humble Beginnings

A far cry, this, from the dingy basement in the Basin Reserve pavilion which was the only accommodation the Wellington children had hitherto. But similarly humble beginnings established the other centres some years ago under education boards in Auckland, Christchurch, and Dunedin, and minor centres have been established by the parents themselves in Otahuhu, Hamilton, Hastings, New Plymouth, Wanganui, Palmerston North, Gisborne and Invercargill. Although it is

[*John Ashton photo.*

less than a year since a branch was formed in the Wairarapa, members have already secured two rooms at a Carterton school and are hard at work papering, painting, and equipping them and arranging transport so that children from Masterton and outlying districts can attend the centre. So enthusiastic are the Wairarapa parents over their project that a number of them visited Wellington specially to be present at the opening of the new school.

Transport in the main cities is the responsibility of the education boards, but it is a major problem for the smaller centres, entailing considerable expense from funds raised by parents. Incidentally, tribute should be paid to the taxi drivers whose task it is to take these intellectually handicapped children to and from school. They usually become so attached to their charges that they look after them as carefully as if they were their own children.

The Education Department makes an initial grant toward the starting of a minor centre, and when the roll numbers 16 the local education board accepts the responsibility for securing permanent premises, staff, and transport. Correspondence courses have also been instituted and a special course which includes directions and advice to parents is proving most valuable.

Much Work Still to be Done

Thus the work progresses, yet much remains to be done. Not only is there need for adequate educational facilities for the 5 to 18 year olds, but occupation centres are needed where older age groups can maintain and continue the education received, for those who are happily and usefully employed are an asset to the community. Moreover, the establishment of cottage homes instead of large institutions is advocated so that children can be treated individually and have the nearest approach to a true home environment and so that those bereft of parents through illness or death will be assured of a friendly haven. Another very important aim is to undertake research into the causes of mental deficiency and possible remedies and prevention of it. The consultative committee set up by the Minister of Education to consider the whole problem will present its report shortly.

And those of us who are fortunate enough to have strong, healthy, bright-faced children should surely remember the parents who bear the heavy burden of a physically or intellectually handicapped child and seek to lighten that burden a little by giving of our friendship, practical help, and understanding.

Woollen Gloves in Lace Pattern

TO make the woollen gloves in lace pattern illustrated the materials required are 2oz. of 3-ply fingering wool, a pair of No. 13 knitting needles, and a No. 10 crochet hook. The gloves are size 6¾ and the tension is 9 st. and 10 rows to 1in. in st.st.

ABBREVIATIONS: K., knit; p., purl; patt., pattern; cont., continue; st., stitch(es); st.st., stocking stitch; wl. fwd., wool forward; sl., slip; p.s.s.o., pass slip stitch over; tog., together; rep., repeat; inc., increase(s).

Right-hand Glove

Using No. 13 needles, cast on 52 st. Work in a k. 1, p. 1 rib for 2in. Cont. in following patt. First row: K. 4, * k. 1, wl. fwd., k. 2, sl. 1, k. 1, p.s.s.o., k. 2 tog., k. 2, wl. fwd., rep. from * once, k. to end. Second row: P. Third row: K. 4, * wl. fwd., k. 2, sl. 1, k. 1, p.s.s.o., k. 2 tog., k. 2, wl. fwd., k. 1; rep. from * once, k. to end. Fourth row: P.

Shape for Thumb

First row: K. 4, * k. 1, wl. fwd., k. 2, sl. 1, k. 1, p.s.s.o., k. 2 tog., k. 2, wl. fwd, rep. from * once, k. 3, k. twice into next 2 st., k. to end. Second row: P. Third row: K. 4, * wl. fwd., k. 2, sl. 1, k. 1, p.s.s.o., k. 2 tog., k. 2, wl. fwd., k. 1; rep. from * once, k. 3, k. twice into next st., k. 2, k. twice into next st., k. to end. Fourth row: P.

Now cont. in patt., increasing for thumb on every k. row and working 2 extra st. between the inc. until there are 26st. on the thumb. Work 4 rows without shaping, finishing with a p. row.

Next row: Patt. across 25 st., and put these st. on a safety pin. K. across thumb st., turn. Put remaining 25 st. on a safety pin.

Cont. on thumb st. thus: First row: Cast on 4 st., p. to end. Second row: K. 1, k. 2 tog., k. to last 3 st., k. 2 tog., k. 1. Third row: P. Fourth row: K. 1, k. 2 tog., k. to last 3st., k. 2 tog., k. 1. Fifth row: P.

Now cont. in st.st. without shaping until thumb measures 2½in.

Shaping Top

K. 2, k. 2 tog. to last 2 st., k. 2. Next row: P. Next row: K. 2 tog. all along. Break off wool, leaving a length hanging and sew up thumb.

With right side of work toward the knitter pick up and k. 4 st. at base of thumb, k. across st. on safety pin.

Next row: P. across all st. Now cont. in patt., working 25 st. on front in patt. and remainder in st.st. until 1½in. have been worked above thumb, finishing after a p. row.

First Finger

K. 35, turn, cast on 4., p. 16, turn. Cont. in st.st. on these 20 st. for 2½in. or length required. Shape top: K. 2, k. 2 tog. all along. Next row: P. Next row: K. 2 tog. Next row: P. Break off wool, leaving length hanging, thread through st., draw up, and sew up seam.

Second Finger

K. 7 st. from front of hand, pick up, and k. 4 st. at base of first finger, k. 7 from back of hand, turn, cast on 2. Work as for first finger for 2¾in. Shape top as first finger.

Third Finger

K. 7 from front of hand, pick up and k. 2 st. at base of second finger, k. 7 from back, cast on 2. Work as for first finger.

Fourth Finger

K. st. from front, pick up, and k. 4 st. at base of third finger, k. st. from back. Work in st.st. for 2in. Shaping top: K. 2, k. 2 tog. all along. Next row: P. Next row: K. 2 tog. all along. Break off wool, leaving a length hanging, pass through st., draw up, and sew up seam.

Left-hand Glove

Work ribbing as for right hand. First row: K. 27, k. 3, rep. from * of first patt. row. ending k. 4. Second row: P. Third row: K. 27, k. 3, rep. from * of third patt., ending k. 4. Fourth row: P.

Shape for Thumb

First row: K. 25, k. twice into next 2 st., k. 3, rep. from * of first patt. row, ending k. 4. Now cont. to match with right hand.

◆

Quick Way of "Flouring Meat"

OFTEN a recipe requires "floured" meat, and it is useful to have a method which will prepare the meat quickly and easily, such as the paper-bag method described here.

Put sufficient flour and seasonings in a paper bag. Cut the meat to the desired size, drop the pieces in the bag, and shake the bag, holding the top firmly. The meat will then be evenly coated.

Several pieces of meat may be done at one time, depending on their size.

This method is also useful for "crumbing" meat and fish.

—*NELL MACPHERSON,*
Field Officer in Rural Sociology,
Department of Agriculture,
Auckland

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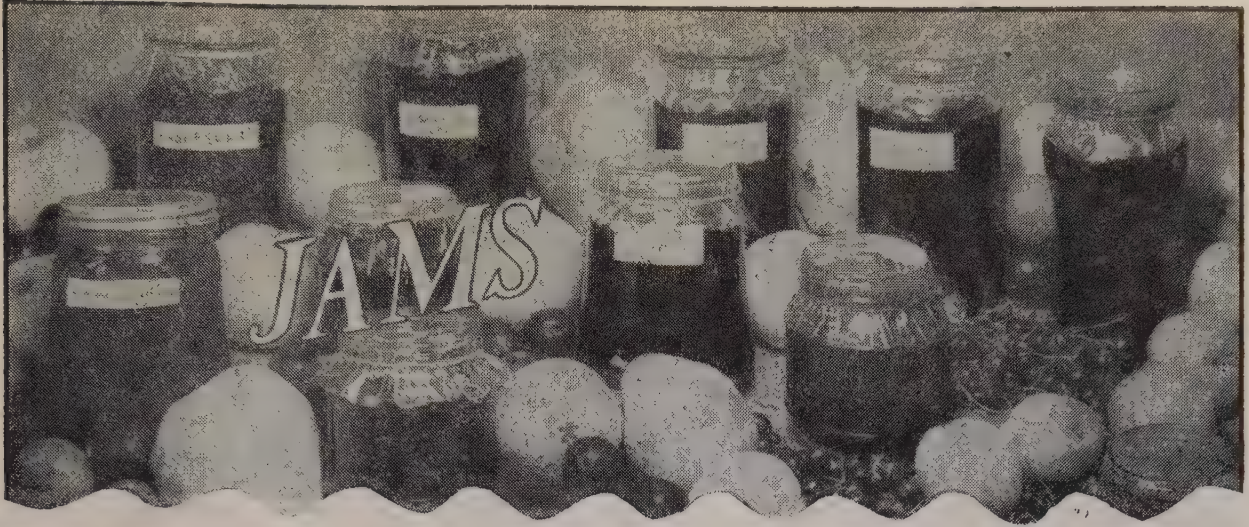


By NELL MACPHERSON, Field Officer in Rural Sociology, Department of Agriculture, Auckland

NO store cupboard can present a completely satisfying picture to a competent housewife unless it contains some home-made jam. With the excellent supply of different fruits available during the year, it is possible to make a wide variety of jams. In this article the general method of making jam is given, together with some points to watch and some recipes.

JAM should be soft and thick with the flesh of the fruit. Though it should not hold its shape if it is to be spread evenly, it should not be runny or syrupy. The pulp should be evenly distributed throughout the jam and the colour should be bright and clear.

Jam will not set unless both pectin and acid are present. As the amount of pectin and acid decreases in a fruit as it ripens, it is wise to use a mixture of ripe and slightly under-ripe fruit to get the best results. The ripe fruit enhances the colour and flavour of the finished product and the under-ripe fruit helps to give it good setting qualities. There are some fruits which will never make good jam on their own; among them are cherries and strawberries. These varieties are generally combined with others, such as lemons, to give a good result. The lemon does not influence the flavour of the finished product very greatly.

It is much easier and quicker to make up several small quantities of jam than one large quantity, and for this reason it is wiser not to make up more than 4lb. of fruit at a time. Although the perfect fruit which is desirable for preserving is not necessary for jam, the fruit should be fresh and any blemishes should be removed in preparation of the fruit.

There are two general methods of making jam. In one the fruit and sugar are cooked together. This method gives a jam with larger pieces of fruit in it and is a longer process. In the other the fruit is cooked until it is soft and then the warmed sugar is added. This jam has a more even texture and the pulp is evenly distributed throughout the jam.

Directions for Making Jam

1. Prepare the fruit according to its kind and weigh it. Note: Crush berry and other soft fruits; peel, core, and chop or mince firm fruits; remove the stones from stone fruits, crack some, and add the kernels to the fruit mixture to improve the flavour.

2. Weigh the prepared fruit.

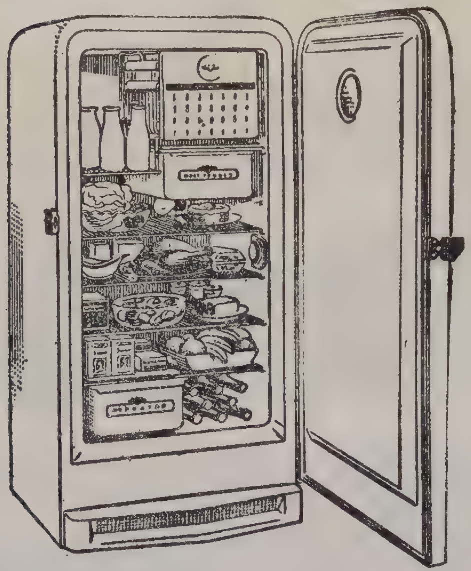
3. Allow ¾lb. to 1lb. of sugar to each 1lb. of fruit. (This depends on the tartness of the fruit.)

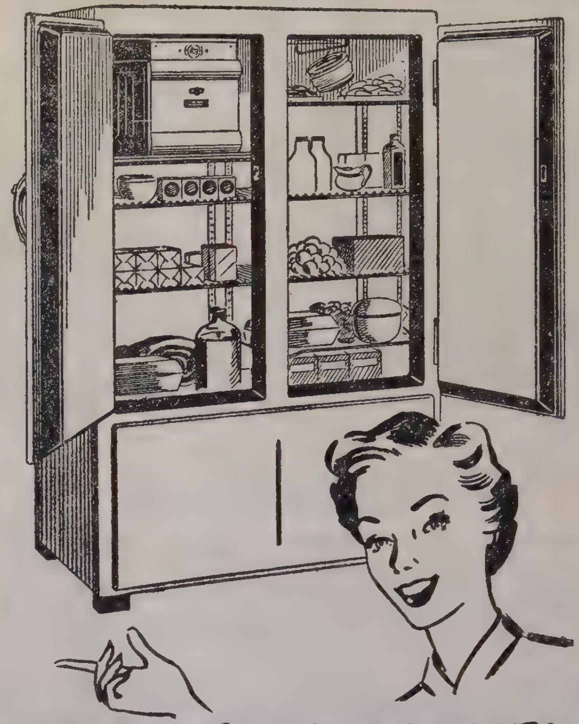
4. Start the fruit cooking in a preserving pan with a little water if necessary. (Grease the saucepan to prevent the jam sticking.)

5. While the fruit is cooking warm the sugar in the oven.

6. Wash the jam jars in hot soapy water, scald them, and allow them to drain.

7. When the fruit is soft and nearly cooked add the warmed sugar, stirring rapidly. (Warmed sugar does





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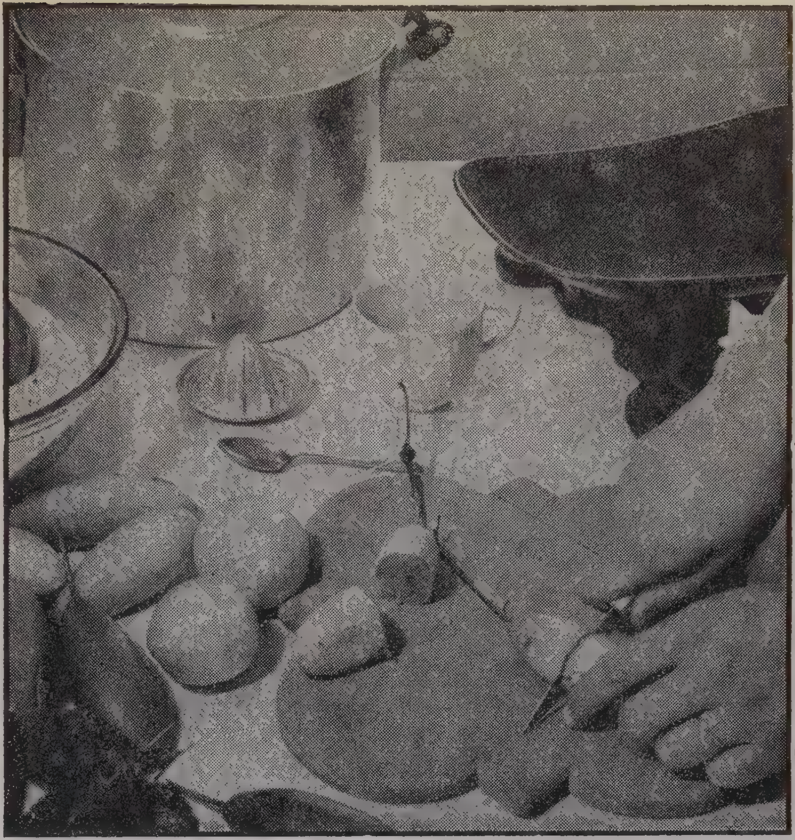


Preparing banana passion fruit for making jam.

not cool the jam as much as cold sugar and thus the jam does not take so long to make.) Allow the sugar to dissolve thoroughly over gentle heat.

8. Put the clean jars in the oven to warm thoroughly. Do not let the oven go above 250 degrees F.

9. Bring the jam back to the boil and boil hard, stirring constantly with a wooden spoon. As soon as the jam no longer runs from the spoon in a thin liquid start testing for setting. This is usually 10 to 15 minutes after the jam boils. While testing for setting draw the pan aside from the heat so that it does not overboil.

10. When the jam is done remove it from the heat and fill the hot sterilised jars. Cover as soon as possible.

11. Label the jams and store them in a cool, dry cupboard.

Setting Test

Testing for setting should be done first after the jam has boiled for 10 minutes. Put about a tablespoon of jam on a clean, cold saucer and allow it to cool—about 3 minutes. Tilt the saucer and if the surface of the jam wrinkles, the jam will set.

Faults in Jam

Thin, runny jam: Too much water was added there was not enough pectin or acid in the fruit, or the jam was not boiled long enough.

Very thick, brownish jam with a caramel flavour: Overcooked.

Sugar crystals on top of the jam: Not properly cooked.

Mould on top of the jam: Not enough sugar, not enough boiling, or jars not properly cleaned or sterilised.

Recipes

Apple

4lb. of apples (peeled, cored, and sliced)
4lb. of sugar
Juice of 2 lemons
½ pint of apple liquid

Put the peel and cores in a saucepan and add 1 cup of water. Bring to the boil and cook gently for 5 minutes. Strain off the liquid. Put the sliced apples in a greased preserving pan and add the apple liquid and lemon juice. Bring to the boil and cook gently till the apples are soft. Add the warmed sugar and allow it to dissolve. Bring the jam to the boil and boil it hard until it gives the setting test. Ladle into clean sterilised jars and cover and label them.

Apricot (Fresh)

4lb. of apricots (halved and stoned)
4lb of sugar
¾ pint of water
Juice of 1 lemon

Crack about a quarter of the stones and remove the kernels. Put the water, lemon juice, and cut-up apricots in a greased pan and bring to the boil. Cook until the apricots are tender and then add the sugar. Allow the sugar to dissolve, bring the jam to the boil, and boil it hard until it gives the setting test. Pot the jam and cover and label it.

Apricot (Dried)

1lb. of dried apricots
2 lemons
3lb. of sugar
3 pints of boiling water

Wash the fruit and soak it overnight in the water. Put the fruit mixture into a greased preserving pan, add the grated rind and juice of the lemons, and bring to the boil. Cook it until the fruit is tender (½ hour). Add the warmed sugar and allow it to dissolve. Bring the jam to the boil and boil hard until it gives the setting test. Pot the jam and cover and label it.

Blackberry

2lb. of blackberries
2lb. of sugar

Wash the berries in a colander under running water. Turn them into a greased preserving pan and crush them with a potato masher. Heat slowly until a certain amount of juice appears and the berries are quite soft. Add the warmed sugar and stir until it is dissolved. Bring to the boil and boil until it gives the setting test (15 to 20 minutes). Pot, cover, and label it.

Black Currant

3lb. of currants
4 cups of water
5lb. of sugar

Wash the currants and pat dry in a clean tea towel. Boil the currants and water together until tender (20 minutes). Add the warmed sugar and stir until it is dissolved. Bring the jam back to the boil and boil hard for 10 minutes, stirring constantly, or until it gives the setting test. Pot, cover, and label it.

Banana Passion Fruit

Banana passion fruit pulp
Sugar
Juice of 2 lemons

Allow 1lb. of sugar to each 1lb. of pulp. Boil the pulp and lemon juice until the pulp is soft. Strain through a sieve to remove the seeds. Return to the heat and add the sugar, stirring until it is dissolved. Boil hard, stirring constantly until the jam gives the setting test. Pot, cover, and label it.

Cape Gooseberry

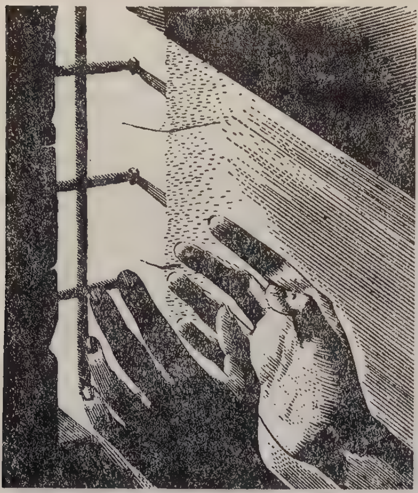
1lb. of shelled cape gooseberries
1lb. of sugar
Juice of 1 lemon

Put the juice of the lemon in the greased preserving pan and add the cape gooseberries. Heat gently and crush the berries with a potato masher. Cook until the berries are soft and pulpy. Add the warmed sugar, stirring constantly until it has dissolved, and bring it to the boil. Boil hard until it gives the setting test. Pot, cover, and label it.

Cherry

4lb. of cherries (pitted and stemmed)
3½lb. of sugar
1 pint of red-currant juice (or juice of 3 lemons)

Place the cherries with some stones in the red-currant juice and cook gently until tender. Add the warmed sugar, stirring constantly until it is dissolved. Bring back to the boil and boil hard until it gives the setting test. Remove the stones with a perforated spoon, and pot, cover, and label the jam. If liked, the cherries may be cooked with the stones in, when they can be removed gradually during cooking.



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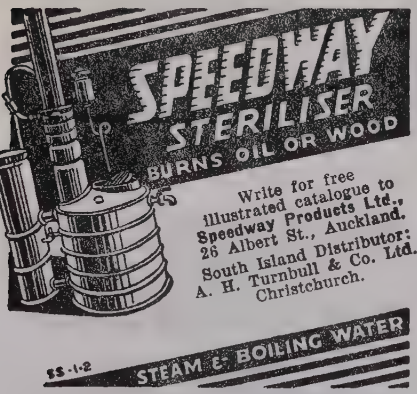

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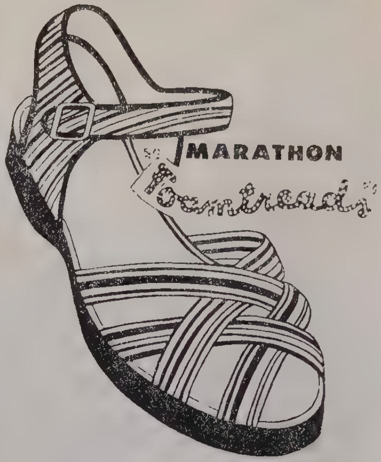

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Chinese Gooseberry

4lb. of Chinese gooseberries
3lb. of sugar
4 medium-sized oranges
2 cups of water

Cut the Chinese gooseberries in halves and scoop the flesh into a greased preserving pan. Add the water and boil until the fruit is tender. Add the juice and grated rind of the oranges and the warmed sugar. Boil the jam hard until the setting stage is reached. Leave the jam to cool slightly, stir it, and fill the jam jars. Cover and label the jars.

Choko and Lemon

3lb. of peeled, sliced chokos
2 large lemons
3lb. of sugar
1 teaspoon of passion fruit essence

Steam the sliced choko until it is tender. Add the juice and grated rind of the lemons and the cold sugar and leave for 24 hours. Place in a greased saucepan and heat carefully until all the sugar is dissolved. Boil until the choko is transparent and the jam is thick. Stir in the passion fruit essence, and pot, cover, and label the jam.

Damson

3lb. of damsons
½ pint of water
2½lb. of sugar

Gently boil the damsons in the water until they are tender and remove the stones with a perforated spoon. Add the warmed sugar, bring the jam to the boil, and boil for 10 minutes or until it gives the setting test. Pot, cover, and label the jam.

Feijoa

2lb. of peeled, sliced feijoas
¼ pint of water
Grated rind and juice of 1 lemon
2lb. of sugar

Simmer the fruit in the water until it is tender. Add the lemon juice and rind and the warmed sugar. Bring to the boil and boil hard for 10 minutes or until the jam gives the setting test. Pot, cover, and label the jam.

Fig (Fresh)

4lb. of figs
3½lb. of sugar
Juice of 4 lemons
3 cups of water
Pinch of salt

Slice the figs and then put all the ingredients in a preserving pan and leave overnight. Bring to the boil, stirring constantly, and then boil hard until the jam gives the setting test (about 1 hour). Pot, cover, and label the jam.

Fig (Dried)

1lb. of figs
1 pint of water
4lb. of rhubarb
4lb. of sugar

Cut the figs into pieces and boil them until soft in the water. Chop the rhubarb into ½in. pieces and add it to the figs. Bring to the boil and add the warmed sugar. Boil hard until the jam gives the setting test. Pot, cover, and label the jam.

Gooseberry (Green)

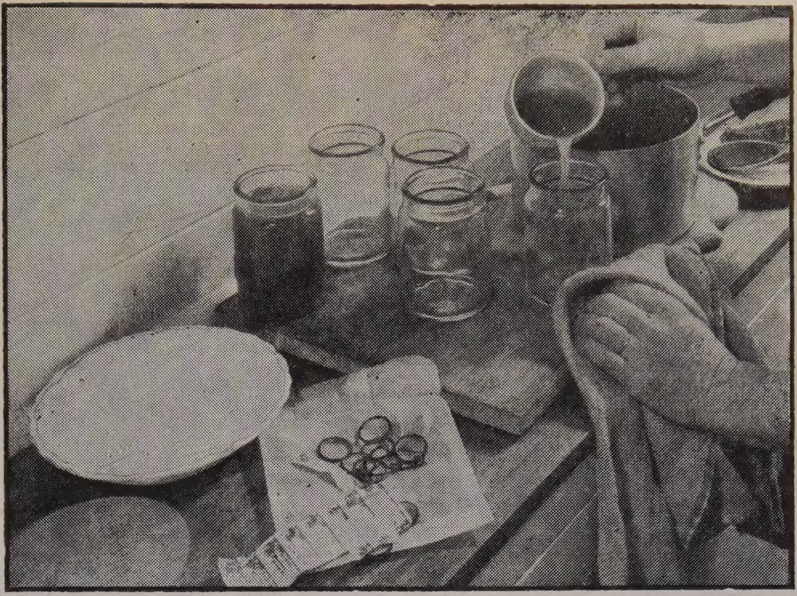
3lb. of green gooseberries
5lb. of sugar

Top and tail the gooseberries and place in a preserving pan. Add just enough water to cover the gooseberries and boil until the gooseberries are soft. Add the warmed sugar and stir the jam until it is dissolved. Bring to the boil and boil hard for 10 minutes or until the jam will give the setting test. Pot, cover, and label the jam.

Gooseberry (Ripe)

3lb. of gooseberries
1 pint of water
3lb. of sugar

Top and tail the gooseberries and place them in a preserving pan with the water. Cook them until they are tender (20 minutes), add the warmed sugar, and boil hard, stirring constantly until the jam gives the setting test. Pot, cover, and label the jam.



Potting the jam in hot sterilised jars.

Grape

2lb. of grapes
1½lb. of sugar

Put the grapes in a saucepan and heat gently. Mash the fruit with a potato masher. Bring to the boil and boil 5 minutes. Remove the seeds with a perforated spoon. Add the warmed sugar, stirring until it is dissolved, then boil the jam hard until it gives the setting test. Pot, cover, and label the jam.

Loganberry

2lb. of loganberries
2lb. of sugar

Put the loganberries in a preserving pan with a little of the sugar and heat gently while crushing the fruit with a wooden spoon. When there is some juice extracted bring the jam to the boil and boil it hard for 5 minutes. Add the remainder of the sugar (warmed), and stir until it is dissolved. Bring to the boil and boil it hard for 5 minutes or until it will give the setting test. Pot, cover, and label the jam.

Loquat

4lb. of loquats
4lb. of sugar
1 pint of water

Cut up the loquats and remove most of the seeds. Gently boil the loquats and some seeds in the water until the fruit is tender. Remove the seeds and add the warmed sugar, stirring until it is dissolved. Bring the jam to the boil and boil it hard until it gives the setting test. Pot, cover, and label the jam.

Marrow

4lb. of green marrow pieces
4 lemons
½oz. of ground ginger
4lb. of sugar

Put the marrow pieces, the grated rind and juice of the lemons, and the sugar in a preserving pan and leave overnight. Bring the mixture to the boil, stirring constantly, and add the ground ginger. Boil it hard about 2 hours or until the jam gives the setting test. Pot, cover, and label the jam.

Melon

4lb. of cut-up melon
3lb. of sugar
Juice of 1 lemon
½ teaspoon of tartaric acid

Put the melon in a preserving pan and sprinkle it with ½lb. of the sugar and leave overnight. Heat gently, and gradually add the remainder of the sugar, the tartaric acid, and the lemon juice. Boil the jam fast for about 2 hours or until it gives the setting test. Pot, cover, and label the jam.

Nectarine

4lb. of stoned nectarines
3lb. of sugar
1½ cups of water
6 to 8 kernels

Cut up the nectarines and add the water and the kernels. Cook gently until the fruit is tender. Add the warmed sugar and stir until it is dissolved. Bring to the boil and boil the jam fast until it gives the setting test. Pot, cover, and label the jam.

Peach

4lb. of sliced peaches
3lb. of sugar
1 cup of water
6 to 8 kernels

Gently boil the peaches and kernels in the water until the the fruit is quite soft. Add the warmed sugar, stirring until it is dissolved. Bring to the boil and boil fast until the jam gives the setting test. Allow the jam to cool slightly before potting. Cover and label the jars.

Passion Fruit

Passion fruit
Sugar

Halve the passion fruit and scoop out the pulp. Boil a quarter of the skins until tender and remove the soft pulp. Add it to the seeds and juice and weigh it. Allow ¾lb. of sugar to each 1lb. of pulp. Bring the pulp to the boil and boil hard for 10 minutes. Add the warmed sugar and stir until it is dissolved. Bring to the boil and boil it until it gives the setting test. Pot, cover, and label the jam.

Pear

4lb. of pears (peeled and sliced)
3lb. of sugar

Put the pears and ½lb. of the sugar into a saucepan and heat gently, mashing with a potato masher to bring out the juice. Bring to the boil and boil until the fruit is quite soft. Add the remainder of the sugar warmed, and stir until it is dissolved. Boil the jam quickly until it gives the setting test. Allow the jam to cool slightly before potting it. Cover and label the jars.

Persimmon

2lb. of persimmon pulp
1lb. of rhubarb
3lb. of sugar

Chop the rhubarb into short lengths and cook it gently in ½ cup of water till tender. Add the persimmon pulp and the warmed sugar and bring to the boil, stirring constantly. Boil the jam until it gives the setting test. Pot, cover, and label the jam.

Plum

3lb. of plums
½ pint of water
3lb. of sugar

Cut the plums in several places, but do not remove the stones. Cook the plums in the water until they are soft and breaking from the stones. Add the warmed sugar and stir until it is dissolved. Bring to the boil and boil fast until the jam gives the setting test. Remove the stones as they rise to the surface. Allow the jam to cool a little before potting. Cover and label the jars.

Quince

Quinces
Sugar

Peel, core, and quarter the quinces. Put them in a saucepan with just enough water to cover them and cook gently until they are soft. Weigh the cooked mixture and for each 1lb. of quince mixture allow 1lb. of sugar. Return the quinces to the heat and bring back to the boil. Add the warmed sugar and stir until it is dissolved. Boil gently until the jam gives the setting test. Pot, cover, and label the jam.

Raspberry

2lb. of raspberries
2lb. of sugar

Put the raspberries in a preserving pan and heat gently until the juice starts to flow. They may be slightly crushed with a wooden spoon if desired. Bring to the boil and boil hard for 3 minutes. Add the warmed sugar and stir until it is dissolved. Boil hard for 5 to 10 minutes or until it will give the setting test. Pot, cover, and label the jam.

Red Currant

4lb. of red currants
4lb. of sugar

Put the red currants in a saucepan and crush with a potato masher. Bring to the boil and cook until the fruit is tender and has lost its shape. Add the warmed sugar and stir until it is dissolved. Boil until it gives the setting test. Pot, cover, and label jam.

Rhubarb

3lb. of rhubarb (cut into short lengths)
½ pint of water
2½lb. of sugar

Put all the ingredients in a saucepan and bring to the boil. Boil fairly hard until the jam gives the setting test. (Rhubarb jam is always fairly soft.)

Strawberry

2lb. of strawberries (hulled)
2½lb. of sugar
2 cups of water
2lb. of rhubarb (cut into short lengths)

Boil the rhubarb in the water until it is soft and pulpy. Strain it and make the juice up to 2 cups with hot water if necessary. Put the 2 cups of juice and the sugar into a preserving pan and bring to the boil. Add the strawberries and boil rapidly until the jam gives the setting test. Allow the jam to cool and skim off any scum. Stir the jam and pot it. Allow the jam to become cold before covering with melted paraffin wax, and then cover and label the jars.

Tomato (Green)

3lb. of tomatoes
3lb. of sugar
3 lemons
1 cup of water

Chop the tomatoes and slice the lemons thinly and put them in a saucepan with the water. Bring to the boil and cook gently until the fruits are soft (15 minutes). Add the warmed sugar and stir until it is dissolved. Bring to the boil and boil hard until it gives the setting test. Pot, cover, and label the jam.

Tomato (Ripe)

4lb. of tomatoes (use a mixture of ripe and slightly under-ripe fruit)
1lb. of apples
Juice of a lemon
4½lb. of sugar

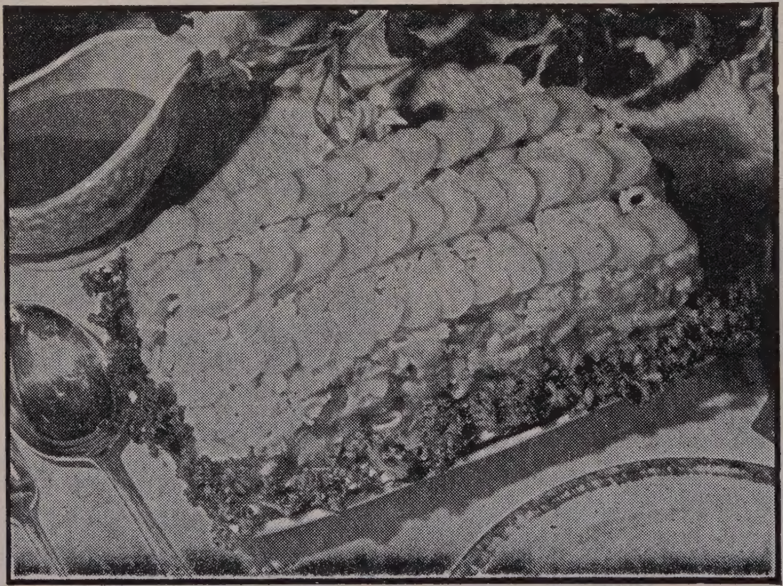
Put the tomatoes in a basin and cover them with boiling water for a few minutes. Pour off the water and peel the tomatoes. Peel, core, and slice the apples. Put the tomatoes and apples in a preserving pan and cook gently, stirring with a wooden spoon to help extract the juice. Cook until the apples are soft. Add the lemon juice and the warmed sugar and stir until the sugar is dissolved. Bring to the boil and boil hard until the jam gives the setting test. Pot, cover, and label the jam.

Tree Tomato

3lb. of tree tomatoes
3lb. of sugar
2 pints of water
2 lemons

Put the fruits in a basin and cover them with boiling water for a few minutes. Pour off the water and peel the fruit. Slice them into a preserving pan and add the water. Peel 1 lemon very thinly and add the peel to the fruit. Remove the pulp from the lemons and add it to the fruit. Boil the fruit mixture until the fruit is tender, then add the warmed sugar, stirring until it is dissolved. Boil hard until the jam gives the setting test. Pot, cover, and label the jam.

Savoury Macaroni Loaf



FOR the savoury macaroni loaf shown above the ingredients required are:—

½lb. of minced cooked meat, preferably veal, pork, rabbit, or similar light meat
1 rasher of bacon
1 onion
½oz. of dripping
½ teaspoon of mixed herbs (or chopped fresh parsley and thyme)
1 egg
Seasoning
6oz. of macaroni

Sprinkle the macaroni and chopped onion into fast-boiling salted water and cook until soft. Drain well and blend with minced meat, herbs, seasoning, and beaten egg. Have ready a square or oblong cake tin and grease thickly with the dripping or lard. Fill up with the macaroni and meat mixture. Place a weighted plate on top and steam for about 45 minutes—10 minutes or so either way will not matter. Turn on to a hot serving dish and garnish with sliced carrots and sprigs of fresh parsley or watercress, serving a little greenstuff with each portion. A thick brown or tomato-flavoured gravy can be served separately with, say, tinned peas or diced mixed vegetables.

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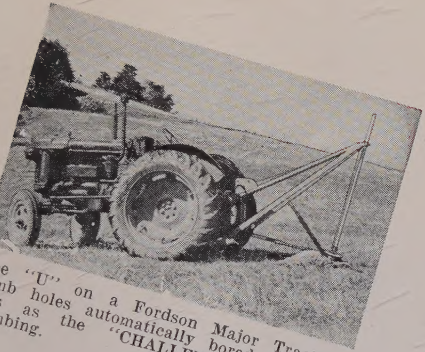
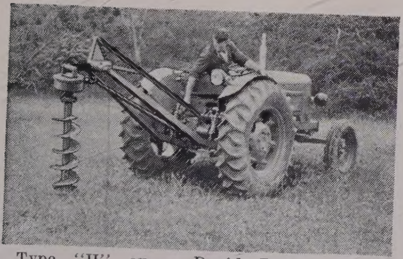
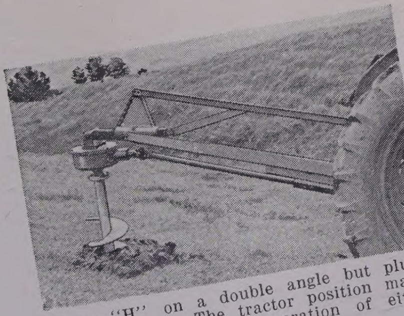


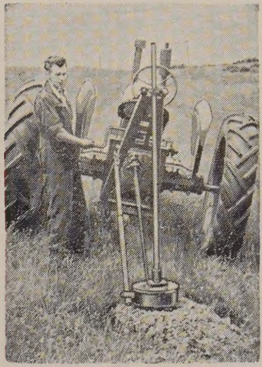
Type "U" on a Fordson Major Tractor. Plumb holes automatically bored on hillsides as the "CHALLENGE" is self-plumbing.



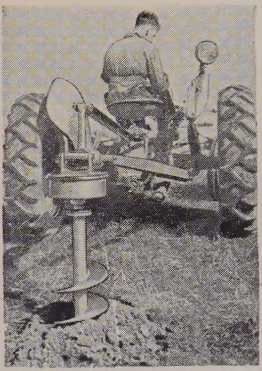
Type "H" on a David Brown Tractor. The operator is engaging the P.T.O. to commence boring.



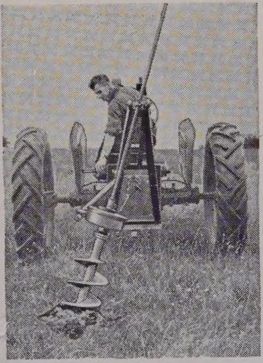
Type "H" on a double angle but plumb hole assured. The tractor position makes no difference to the operation of either type "U" or "H".



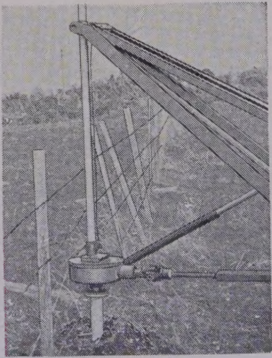
Type "U" on a Massey-Harris Tractor. Note how the operator is controlling the boring with his hand on the winch.



Type "H" on a Ferguson Tractor. Note that operator remains on the tractor seat and holds the hydraulic control lever.



Type "U" on a Massey-Harris Tractor putting down an angle-hole. Illustrating the flexibility of the "CHALLENGE".



Type "U" boring a hole in an existing fence line without removing or slackening any wires. Type "H" will do the same.

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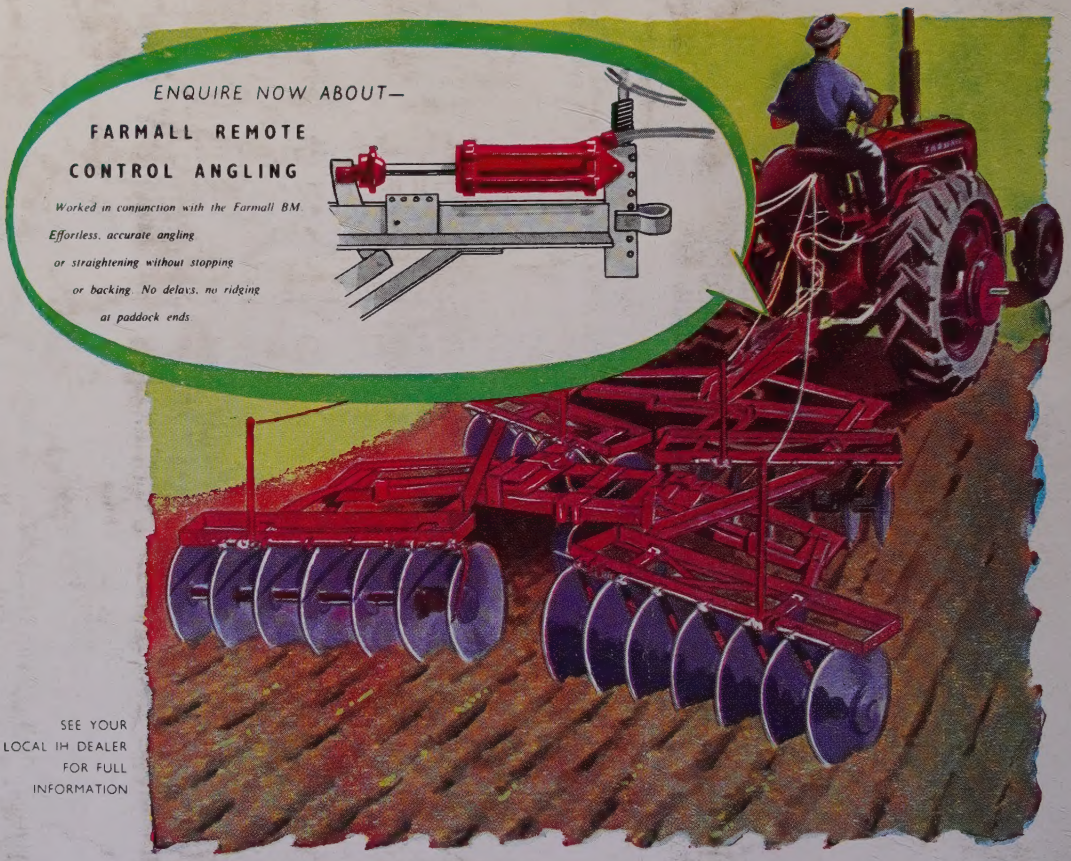

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